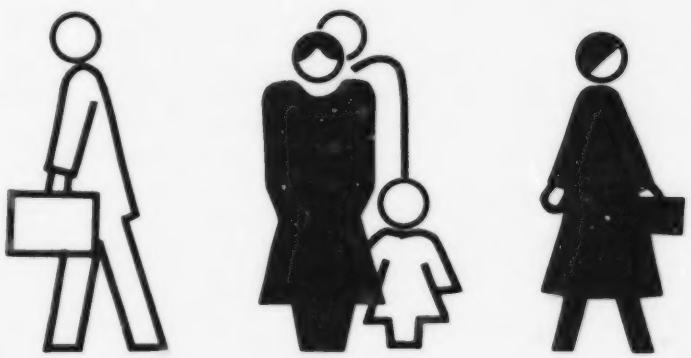
REGIONAL MUNICIPALITY OF WATERLOO

POPULATION FORECASTS 1981-2001



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THE REGIONAL MUNICIPALITY OF WATERLOO

DEPARTMENT of PLANNING and DEVELOPMENT

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POPULATION FORECASTS
FOR THE REGION OF WATERLOO
1981-2001

A. POPULATION GROWTH TRENDS

The importance of a realistic population forecast is clearly established in the capital spending programs of government and the investment plans of private industry. In this Region we have used past regional population forecasts to determine regional road requirements; to measure sewer and water capacity in order to determine construction programs as well as any possible constraints on future growth; to forecast housing needs (for all age groups) and necessary land requirements; to provide information to school boards to enable them to estimate future school requirements; and to provide information to industry and retail establishments, for investment decisions.

Because of the Region's past population growth performance, compared to Canada's and Ontario's, there has always been a tendency to be optimistic in future population forecasts. As a Region our population growth rate was significantly higher than Canada's and Ontario's between 1956 and 1976. Table 1, shows, however, that this growth rate difference declined significantly between 1976 and 1981, so much so that the regional population growth rate was only marginally above that of Canada during this period.

The dramatic drop in this Region's population growth rate is explained entirely by a decline in net migration into this area. From 1961-1966 net migration into this Region totalled 23,643 people. In the following five year periods, migration levels remained high, 21,572 between 1966-1971 and 23,375 between 1971-1976. In 1976-1981 migration levels declined sharply to only 3,103 people.

Our population forecast prepared in 1980 (PD #22/80; 2001 Regional Population Forecast) forecasted a decline in positive net migration over earlier periods but did not anticipate the severity of the economic decline which occurred or the full effect that economic growth in Western Canada would have on migration out of this Region. Thus, our forecast of net migration was high compared to what occurred - 12,000 people as opposed to an actual figure of 3,103 people.

Table 2 shows the different impacts that changes in the components of population growth has had on the Region's population from 1971 to 1981. We find that births and deaths over this period have varied only marginally, so that our annual natural rate of increase has approximated 3,000 people. On the other hand, net migration levels have fluctuated from an inflow of 8,480 people in 1974 to an outflow of -439 people in 1980.

Table 1

Population Trends 1951 - 1981

Canada, Ontario, Region of Waterloo

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		1951	1956	1961	1966	1971	1976	1981
Canada	Pop'n.	14009	16081	18238	20015	21569	23110	24343
	% Change per 5 Yr		14.8	13.4	9.7	7.8	7.1	5.3
Ontario	Pop'n.	4598	5405	6236	6961	7703	8331	8625
	% Change per 5 Yr		17.5	15.4	11.6	10.7	8.1	3.5
Region of Waterloo	Pop'n	126	148	176	216	254	289	305
	% Change per 5 Yr		17.5	18.9	22.7	17.6	14.6	5.5

Source: Census of Canada
Statistics Canada, Ottawa

Table 2

Components of Population Growth

Region of Waterloo 1971- 1981

	Population 1/	Births 2/	Deaths 2/	Natural Increase 2/	Net Migration 3/	Net Migration as % of Growth
1970	243,542					
1971	250,287	4,967	1,574	3,393	3,352	49.7%
1972	258,717	4,675	1,657	3,018	5,412	64.2
1973	265,683	4,867	1,682	3,185	3,781	54.3
1974	277,284	4,869	1,748	3,121	8,480	73.1
1975	286,281	4,917	1,806	3,111	5,886	65.4
1976	289,130	4,769	1,736	3,033	- 184	-6.1
1977	293,277	5,001	1,835	3,166	931	22.7
1978	296,850	4,851	1,798	3,053	570	15.7
1979	300,122	4,774	1,877	2,897	375	11.4
1980	302,620	4,846	1,909	2,937	- 439	- 14.9
1981	307,080	4,694	1,900 (Est.)	2,794	1,666	37.4

1) Estimates of Population between Census years are based on the components method, where all demographic events are added to the Census base to derive an estimated population. Components are births, deaths and net migration. Since component information is available only on an annual basis, the estimated population levels are for the end of year, as opposed to June in the Census years.

2) Ontario Vital Statistics, Births and Deaths, 1970-1981.

3) Statistics Canada, Taxfile Information for the Region of Waterloo, 1977-1981.

The dramatic decline in net migration into this area is explained largely by changes in local job opportunities, compared to national and provincial job opportunities. From 1961-1971 an estimated 42,282 jobs were created in this Region. This declined to an estimated 34,454 jobs created between 1971 and 1981, of which only 7,158 jobs were created since 1976. Since 1981 this Region has in fact had an estimated net loss of 2,746 jobs. This corresponds with an increase in this Region's unemployment rate from an average of 8.0% in June 1981 to 12.5% in the spring of 1983.

The dramatic fluctuations in employment and net migration in this Region were totally unpredictable. *Because of the rapidity and extent of these fluctuations, we now consider it too difficult to independently project net migration into this Region (based solely on the historical migration trends). Rather it is more practical to establish net migration levels, based on an analysis of present and future economic opportunities. This is the procedure we wish to develop in this report and use in part, for forecasting population growth.*

In Part B of this report we briefly outline the methodology used in forecasting population. In Part C we examine components of population change which are natural factors, namely births and deaths. By analysing trends and demographic information, we are able to develop a forecast of natural population increase for the Region of Waterloo to the year 2001. In Part D we examine the effect of job creation activity on net migration based on an analysis of economic opportunities. Part E of this report examines the implications of this population forecast for sewer and water capacity, road needs, housing needs, various social services, school requirements, and the development of economic strategies.

B. FORECASTING METHODOLOGY

Beginning with background studies on population for the Regional Official Policies Plan we have consistently used what is termed as the cohort survival components method in forecasting population. This method employs detail assumptions on fertility, mortality and migration for identified age categories. Thus the forecast is by age groupings not total population. The advantage of using this method is that many policy decisions must take into account the population age composition. (e.g. forecasts of school enrollment, household growth, labour force, etc.).

In this report assumptions on fertility and mortality are discussed in detail by age categories. The population forecast presented, however, is total population. Appendix D shows the age distribution of the recommended population forecast. The population forecasts presented were developed first for the Region and then by local municipality. The allocation on a municipal

basis was determined from discussions with municipal staff in 1982 on the transportation plan update. The method of allocation by municipality is discussed in Appendix E.

C. FORECAST OF NATURAL POPULATION INCREASE TO 2001

By natural population increase (decrease) we are referring to that change in a population brought about by births and deaths. To forecast future changes in birth and death rates it is important to examine past trends. When we do this we find that changes in death rates have been both very gradual and predictable.* The same is not true for birth rates. Therefore, in this section we concentrate our discussion on birth rates and factors which may affect changes in birth rates in the future.

1) Natural Increase: Birth Rates

a) Past Trends

Since the early 1950's birth rates have been declining in this Region, as well as in Ontario, Canada and most western industrialized nations. *Since 1961 the total number of births per 1,000 females between 15 and 49 years of age (general fertility rate) in the Region of Waterloo declined by approximately 50%, to 57 births per 1,000 in 1981 from 107 births per 1,000 in 1961.* This level is still above Ontario's general fertility rate of 53.1 births per 1,000 in 1981. Despite this overall decline, since the mid-1970's we have seen that for some age groups that the rate of decrease has been levelling off.

Table 3 shows that *for the age groups between 25 and 39 since 1976, births per 1,000 females has in some years increased.* This trend is more clearly illustrated in Figure 2 on page 14 which shows a general levelling off of fertility rates per 1,000 women for the age groups 30-34 and 35-39, and a significant decline in the rate of decrease for the age group 25-29. For the age groups 15-19 and 20-24, fertility rates per 1,000 females has continued to decrease, almost at a constant rate since 1963. Since about 1974 births per 1,000 women for the age group 40-49 has also levelled off. Despite these decreases in age specific birth rates, the total number of births in the Region, as shown in Table 4 has not fluctuated widely. Rather, because of an increase in the number of females of child-bearing years (brought on by the baby boom generation born from 1950-1963) the total number of live births per annum actually increased slightly in the 1970's. *However, as our population ages, the lower birth rate trend will result in a substantial decrease in live births.*

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* Death rates are calculated for specific age groups from deaths per 1,000 people per annum.

Table 3

Derived Births/1000 Female Population* By Age Specific Categories for Region of Waterloo

Year	Age of Women						
	Less than 20	20 to 24	25 to 29	30 to 34	35 to 39	40 to 49	General Fertility Rate
1961							107.2
1962							104.3
1963	58.6	212.6	202.9	134.3	62.3	13.9	101.8
1964	61.9	218.2	186.1	125.6	65.9	12.4	100.3
1965	66.0	200.3	187.8	116.7	61.2	10.8	96.6
1966	62.3	187.7	172.7	109.8	57.9	10.7	90.9
1967	55.3	168.8	160.9	97.3	48.5	8.3	82.5
1968	50.9	164.6	161.1	86.0	44.9	7.8	80.2
1969	56.1	160.8	166.0	94.8	38.8	7.1	82.6
1970	57.0	153.2	158.3	89.2	38.8	7.3	80.7
1971	48.5	147.6	155.5	87.0	34.8	4.0	77.4
1972	50.7	125.1	145.4	75.2	30.2	3.1	70.5
1973	51.5	126.7	147.1	67.4	29.2	3.5	71.1
1974	47.3	117.2	149.2	69.1	21.9	2.4	68.8
1975	43.4	115.7	142.4	68.9	19.9	2.3	67.2
1976	43.5	105.1	126.6	65.9	23.6	6.0	62.1
1977	37.7	111.6	136.8	69.9	19.4	2.1	65.0
1978	34.3	103.9	132.5	70.5	19.6	1.9	62.0
1979	30.1	105.6	127.5	67.4	19.4	1.8	60.0
1980	30.5	99.8	134.4	66.8	19.0	1.9	60.0
1981	27.0	93.5	128.6	67.8	18.0	2.2	57.0

* Derived from Table 4 by extrapolating a Regional Population for non-census years.

Table 4
Actual Live Births by
Age of Mother
Region of Waterloo

Year	Age Of Mother						
	Less than 20	20 to 24	25 to 29	30 to 34	35 to 39	40+	Total Births
1961							4503
1962							4570
1963	447	1450	1276	889	434	158	4656
1964	513	1625	1206	835	463	147	4791
1965	595	1628	1254	779	434	133	4824
1966	610	1666	1187	736	415	138	4753
1967	561	1610	1192	667	349	110	4490
1968	535	1686	1287	603	325	106	4547
1969	612	1770	1429	680	282	100	4877
1970	644	1811	1469	655	283	105	4967
1971	568	1874	1557	653	255	59	4967
1972	612	1643	1544	602	225	47	4675
1973	640	1720	1657	576	221	53	4867
1974	607	1645	1783	629	169	36	4869
1975	573	1679	1805	669	156	35	4917
1976	577	1578	1701	683	188	62	4769
1977	517	1675	1853	760	163	32	5001
1978	476	1558	1809	805	173	29	4851
1979	421	1583	1755	807	180	28	4774
1980	430	1496	1864	840	186	29	4846
1981	384	1401	1796	893	186	34	4694

Source: Statistics Canada, Vital Statistics, Volume 1, Births and Deaths, 1961-1981.

b) Important Demographic Factors

In order to forecast changes in birth rates it is necessary to examine demographic information as well as past trends. Demographers have found that birth rates are influenced by a variety of factors including:

1) rate of marriage and age of first marriage (and corresponding birth rates for that age group)

2) female labour participation rates, and the changing roles of women

3) attitudes towards smaller family sizes and childless couples

4) access to effective birth control

5) the cost of raising children

Although the occurrence of childbirths outside of marriage are expected to increase, the overall fertility rates for women are still largely expected to be influenced by *births within marriage*. While marriage rates, per 1,000 population have been continuously declining since 1970, divorce rates have increased to an estimated annual rate of 3.5% of the population over 15 years of age in 1980 from 2.4% in 1970. Moreover, the average age at first marriage has been continuously shifting to older age categories in Ontario. This decrease in marriage rate, an increase in divorce rate, and an older age at first marriage, have all contributed to a decrease in birth rates in Ontario. Demographers anticipate that these trends will continue, thus putting further downward pressure on birth rates.

A rise in *female labour participation rates* and the changing role of women in society have also been linked to a decrease in birth rates. Figure 1 provides a comparison of changing overall fertility rates and female labour participation rates for Ontario from 1951 to 1981. The diagram shows a strong negative linear relationship between these two variables, i.e., as the incidence of working increases fertility rates drop significantly. Demographers have interpreted this relationship to indicate:

> ".....that working can have the effect of depressing fertility through the mechanism of competition for a women's personal resources".*

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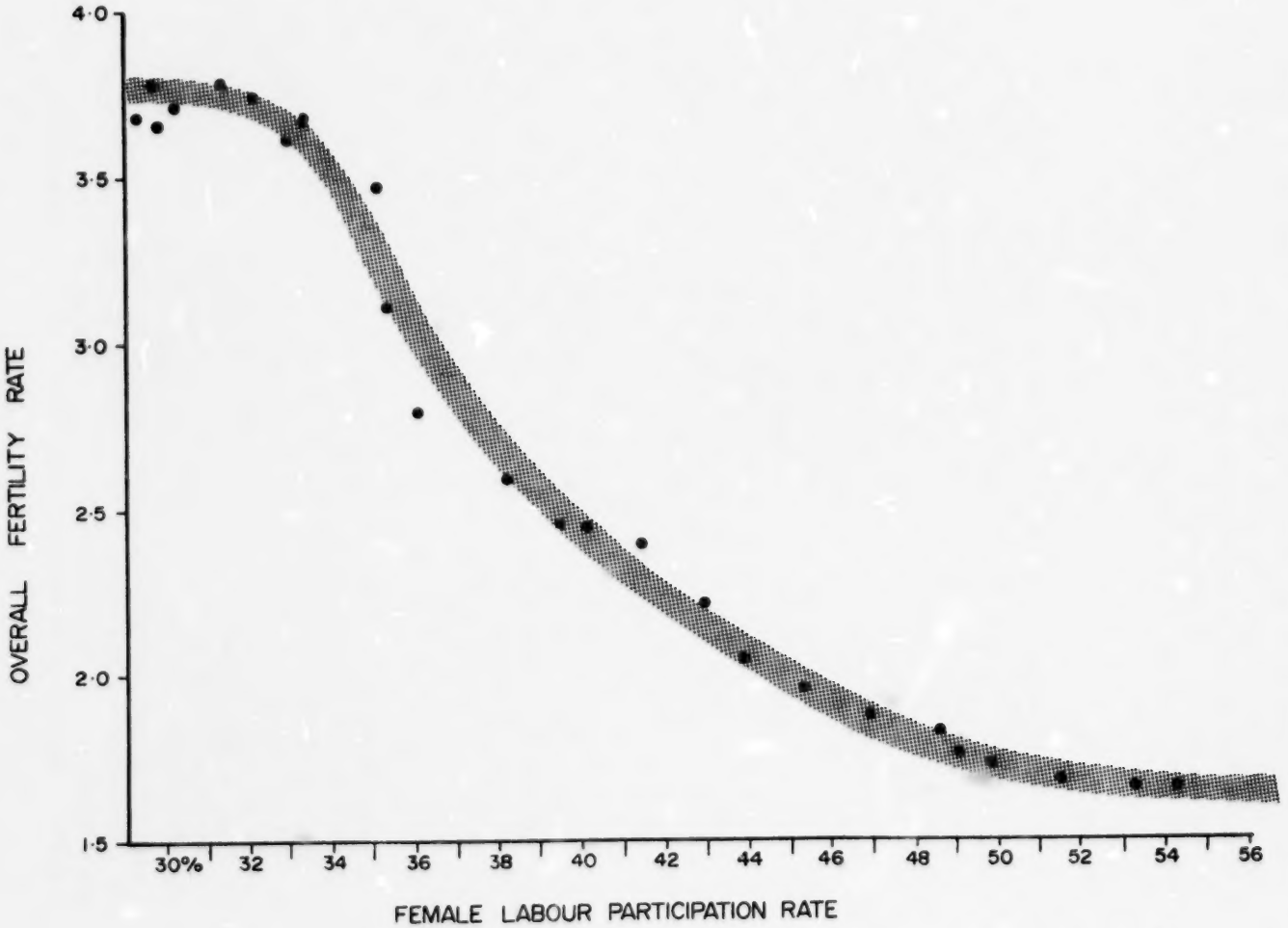
* E.F. Jones, "The Impact of Women's Employment on Marital Fertility" pp. 172.

Figure 1: Fertility Rates by Female Labour Participation Rates for Ontario 1956-1980



SOURCE: Labour Force Participation Rates: Statistics Canada, Historical Labour Force Statistics (71-201)

Births: Statistics Canada, Vital Statistics, Volume 1, Births and Deaths

Figure 1

In other words, female work experience generates an important role alternative and displaces to some degree child bearing. Since it is expected that the incidence of female labour participation will continue to increase, one can expect that this will be an important factor in further reducing birth rates in the future for some age groups. Even if there is a substantial improvement in daycare facilities and services for children of working mothers and paid pregnancy leave, projections for declining birth rates would change somewhat, but a decline would still be anticipated.

In recent years demographers (A.R. Pebley, 1982) have identified a change in *attitude among married couples in favour of either smaller families or no children at all.* Studies in the United States which appear to also be applicable in Canada, indicate that the number of women who have never had a child has doubled from 12% for married women, 25-29 years old, in 1965, to 25% in 1979. Furthermore, in U.S. census surveys 11% of all women 18-34 reported in 1979 that they do not intend to have children. This increase in childless couples combined with some evidence which points towards Canadian couples postponing child-bearing and limiting family size to an average of two children, indicates that a further reduction in overall birth rates is likely.

Improved information in school systems and in society in general on *birth control* as well as more effective birth control methods has also led to a significant reduction in the birth rate for females under 25 years of age. It appears that these factors will continue to result in a reduction of birth rates for these age groups.

If unwanted births are occurring because of current abortion laws, legislative changes making these laws more liberal could affect birth rates. In this Region no accurate information on abortions is available since some of the abortions performed on women living in the Region were done at outside hospitals and some of the abortions done at local hospitals were on women from outside the Region. With this qualification, local hospitals performed 463 abortions in 1982. The complexity of the whole abortion issue, makes it difficult to anticipate how any legislative change would affect birth rates. We will however, continue to monitor this.

One further factor for explaining changes in birth rates links birth rates to *economic activity* or more specifically, economic well-being. The argument goes that as economic times improve, birth rates rise and as economic times worsen birth rates decline. Since recent economic forecasts by the Conference Board of Canada, the Economic Council of Canada and major financial institutions point to little economic growth in Canada for the next decade, it is unlikely that changes in economic factors will result in a turn-a-round in birth rates.

One factor which should also be considered is the ratio of young workers to old workers. As our population ages, young workers may find an increasing demand for their services. This should improve their economic position, enabling them to establish families earlier in life, thus leading to a rise in fertility. Although this may be a long term trend, this factor is not expected to be significant over the forecast period. We will, however, continue to monitor job opportunities for young people to determine if this factor is influencing fertility rates.

c) Forecast of Birth Rates

Prior to 1980 we forecasted that birth rates would turn-a-round in the 1981-1986 period for the age groups between 20-34 years of age. This was based first on the assumption that there was a strong relationship between economic activity and childbearing, and that economic activity would improve between 1981 and 1986; second, that there would be an improvement in day-care facilities; and third, that changes in family law would provide greater family security outside of marriage. In addition to these factors, some of the Province of Ontario's population forecast options also showed a turn-a-round in birth rates.

It now appears that while these factors could result in a higher birth rate, there are other factors now present which are having a far greater effect on birth rates and which point toward a further reduction in overall birth rates. These factors which were not overly visible to demographers and statisticians in the mid to late 1970's include a decrease in the rate of marriage, increases in divorce and separation rates, increases in female labour participation rates, changing attitudes towards smaller family sizes and childless couples, and access to effective birth control.

For our forecast period to 2001 we have taken these emerging factors into account and we expect a further decline in birth rates for most age groups. This forecast is shown in Table 5 and is illustrated in Figure 2, along with historical trends. Total fertility rates are expected to decline in this forecast from an average of 1.72 children per female in child bearing years in 1981 to an average of 1.66 children per female by 2001.

Birth Rate Forecasts for Individual Age Groups

i) Age Groups 15-24

For the age groups between 15-24, we expect that birth rates per 1,000 females will continue to decline, but at a decreasing rate. We expect that a decrease in the rate of marriage combined with slowly improving employment opportunities for women and effective birth control will continue to be the major factors contributing to the decline in birth rates for this age group. By the year 2001, we expect that this trend will be close to levelling off and consequently, the decrease in birth rates in the last five year period, 1996-2001, is only marginal.

ii) Age Group 25-29

Recent birth rate figures for the age group 25-29 for the Region of Waterloo have shown that the past decreases in the birth rate for this age group have been levelling off. This trend is projected in our forecast, resulting in *a very small decline in the birth rate for this age group by the year 2001.*

iii) Age Groups 30-39

Demographers have recently observed a turn-a-round in the birth rates for these age groups. Although not yet evident in our Region, birth rates for these age groups have been rising in Canada and the U.S. over the past few years. Demographers have explained these recent trends by postponed childbearing while females in these age groups were in their twenties, which resulted from improved job opportunities and career objectives. Consequently, children born to parents in these age groups are often the first child.

In our forecast of birth rates for these age groups we expect that *fertility rates will turn-a-round and increase,* but at a decreasing rate. The most

Table 5

Forecasted (1981-2001) Births per 1000 Female Population*

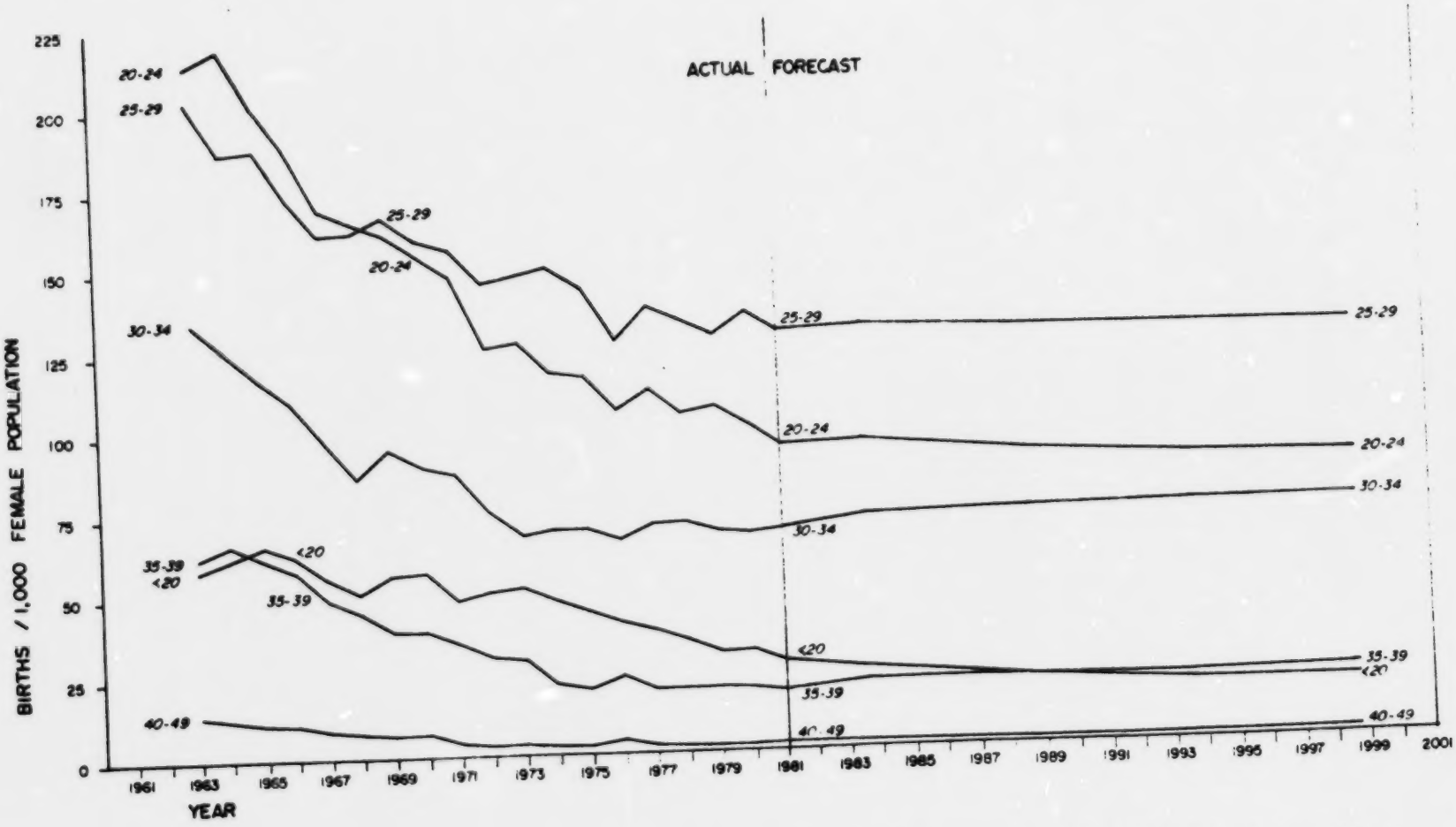
By Age Categories

For the Region of Waterloo

	15-19	20-24	25-29	30-34	35-39	40-49
1981 - 1986	24.4	94.7	129.8	71.4	20.1	1.9
1986 - 1991	20.6	90.5	128.8	72.9	20.7	1.9
1991 - 1996	18.7	88.5	128.2	73.6	20.9	1.9
1996 - 2001	17.8	87.4	128.0	74.0	21.1	1.9

* For actual births per 1000 females population by age categories for 1961 to 1981 see Table 3 of this report.

Figure 2 :
Births per 1,000 Female Population by Age Categories for Waterloo Region



Source: 1961-1981, Statistics Canada, Vital Statistics, Volume 1: Births and Deaths

Figure 2

significant increase is expected to occur for the age group 30-34 where births are expected to increase by 2.6 births per 1,000 by the year 2001.

iv) Age Groups 40-49

The birth rates for age groups in this range have been fluctuating for the past five years. We expect that there will be *no significant future change in the birth rates* for females in these age groups, and thus, we forecast a constant birth rate.

v) Total Fertility Rate

Total fertility rate is best measured by the average number of children per female in child bearing years. This avoids the problem encountered by using births per 1,000 females in child bearing years, where changes in the age structure of females in these years may result in an increase in births per 1,000 females, while age specific birth rates are declining.

In our forecast the total fertility rate is expected to decline from an estimated 1.72 children per female between 1976 and 1981, to a forecasted 1.66 children per female between 1996 and 2001. This level is slightly above the 1981 provincial total fertility rate of 1.65 children, but is well below the 2.1 children per female which is required to replace our population. With these fertility levels therefore, and an aging population we would eventually have a negative natural increase in our population if there is no positive net migration into this Region.

As a last point, the Province of Ontario is currently preparing a revised population forecast. For birth rates they are examining three alternative scenarios: first, a low fertility rate option which has the Ontario total fertility rate decreasing from 1.65 to 1.3 by 2006, second, a medium fertility rate option which forecasts a small decline in provincial total fertility rates to 1986-1991, and a rise back to 1.65 children per female by 2006; and third, a high fertility rate option which forecasts an increase in total fertility rates to 2.25 children per female by the year

2006. In selecting our forecast of birth rates for the Region of Waterloo, we were of the opinion that there was insufficient support from examining factors contributing to birth rates to expect a turn-a-round in total fertility rates. Thus, we discounted the provincial medium and high fertility rate options. We did, however, feel that the past rate of decrease was levelling off and for the age groups between 30-39 there was sufficient demographic support to anticipate a turn-a-round in these age specific birth rates. Thus, our forecast of birth rates is more optimistic than the provincial low option.

2) Natural Increase: Death Rates

In our 1980 population forecast for the Region of Waterloo we employed provincial forecasts of age specific death rates for the Province for our death rate assumptions. This forecast assumed very little change in death rates to 2001. Table 6 shows the forecasted age specific death rate figures for 1981 and 2001.

Since death rates change very little and since the Province has not yet revised these death rate figures, we employ the same death rate figures in our 1983 population forecasts as we did in the previous forecast in 1980. *Any change in these death rate figures are anticipated to be slight, and should not have a significant effect on our popualtion forecast.*

3) Forecast of Natural Population Increase

By applying our forecast of birth rates and death rates to the age distribution of the Region's 1981 Census population, and assuming that net migration will equal zero* over our forecast period, we are able to forecast a Natural Population Increase for the Region to the year 2001. This is distributed by municipality in Table 7 for each of the forecast years. *By the year 2001 our natural population is expected to yield a regional population of 358,953 people, an increase from 305,490 people in 1981.*

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* Zero net migration means that migration out of the Region will equal migration into the Region over the forecast period. The assumption that the age distribution of these populations will be approximately the same seems reasonable given the age distribution of past migration flows to and from the Region. Therefore, no adjustment in the age distribution of the base population has been made to account for migration.

Table 6

Forecasted Death Rates per 1000 Population

By Age and Sex

Region of Waterloo

Age	1981		2001	
	Male	Female	Male	Female
0 - 4	.6	.6	.5	.5
5 - 9	.3	.2	.2	.1
10 - 14	.9	.3	.9	.3
15 - 19	1.3	.3	1.1	.3
20 - 24	.9	.3	.8	.3
25 - 29	.9	.5	.9	.5
30 - 34	1.4	.9	1.4	.9
35 - 39	2.5	1.3	2.4	1.3
40 - 44	3.9	1.9	3.8	1.9
45 - 49	6.6	3.1	6.5	3.1
50 - 54	10.1	4.7	10.4	4.6
55 - 59	16.8	6.8	16.7	6.6
60 - 64	25.4	10.5	25.3	10.6
65 - 69	37.4	16.9	37.4	16.2
70 - 74	52.1	26.5	52.1	25.2
75 - 79	72.6	43.0	72.5	41.2
80 - 84	111.8	86.7	111.7	85.3
85+	200.0	200.0	200.0	200.0

Table 7

Forecasted Natural Population Increase[1] (without students)*

Regional Municipality of Waterloo

Municipalities	1981	1986	1991	1996	2001
Kitchener	139,735	147,204	154,082	159,746	163,848
Waterloo	49,430	53,951	58,115	61,543	64,026
Cambridge	77,170	81,609	85,697	89,063	91,500
Woolwich	16,490	16,572	16,649	16,712	16,757
Wilmot	10,925	10,941	10,957	10,970	10,979
Wellesley	6,770	6,787	6,802	6,815	6,824
North Dumfries	4,965	4,982	4,997	5,010	5,019
Region	305,490	322,046	337,299	349,859	358,953

1) Natural population increase (decrease) is determined by adding births minus deaths to our population base for 1981. It is also based on the assumption of zero net migration.

* Students from outside the Region who are living off campus at the area's two universities and Conestoga College are not included in this population forecast. Based on a 1980 survey of off campus students and projected university and college enrollment, an estimated 2,458 students need to be added to Kitchener's population and 10,216 students to Waterloo's population to account for non-resident students living off campus.

An interesting observation from this Table is that the natural population increase is much less in the 1996 to 2001 period, 9,094 people, compared to the 1981 to 1986 period where the natural population increase was 16,556. This is explained by an aging population and a decrease in the number of births occurring. *As we have previously noted if we were to extend this forecast past 2001, assuming zero net migration, we would eventually have a natural declining population level, due to an aging population and a total birth rate which is less than that required to replace our population (1.66 compared to 2.1 children per female).*

The resulting natural increase forecast gives us an average growth rate for the Region of Waterloo of .8% per annum between 1981 and 2001. By annual averages for each five year period we see the growth rate decreasing steadily from 1.1% between 1981-1986 to .5% between 1996-2001. Again this is accounted for by a decrease in births.

It should be recognized that a condition of maintaining our natural population increase requires that sufficient jobs be created, so that the Region does not experience any negative net out migration. Moreover, to consider any positive net migration into this Region an additional number of jobs have to be created. We now turn to a discussion of alternative migration options linked to economic opportunities in the Region of Waterloo.

D. ECONOMIC OPPORTUNITIES AS A DETERMINANT OF NET MIGRATION

Over the past twenty years, a sufficient number of jobs were created in the Region to not only provide employment for our natural population increase but also to attract a large number of people into this area. *From Table 8 the Region's incremental change in employment between 1961 and 1981 is estimated at 76,736 employees. This, on an average annual basis is equal to 3,836 employees. In the context of this paper the incremental change in employment is equal to new jobs created.* The 76,736 jobs created from 1961 to 1981, attracted a total of 71,693 people into this area (plus providing jobs for the Region's natural population increase).

Table 8

Estimated Employment, Regional Municipality of Waterloo

For Select Years

1961-1983

Year	Labour Force	Estimated Unemployment		Estimated Employment	Incremental Change in Employment
	Column 1	Column 2		Column (1-2)	
1961	72,675 (1)	3,997 (5)	(5.5%)	68,678	
1966	92,877 (2)	3,715	(4.0%)	89,162	20,484
1971	117,315 (1)	6,335 (5)	(5.4%)	110,960	21,798
1976	148,662 (2)	10,406 (6)	(7.0%)	138,256	27,296
1981	158,059 (3)	12,645 (6)	(8.0%)	145,414	7,158
1983	163,049 (4)	20,381 (6)	(12.5%)	142,668	-2,746

(1) Census, Labour Force Statistics, 1961 and 1971 for the County of Waterloo.

(2) Estimated by applying a labour participation rate of 63.1% to the 1966 census population and 66.3% to the 1976 census population for Waterloo Region for ages 15 and over. (See 1980 Population and Employment Report for calculation of 1976 labour force).

(3) Estimated from the Region of Waterloo's 1981 Employment Survey (updated) by adding estimated unemployment to employment. An additional 3,000 employees were added to the updated employment survey to account for agricultural employment.

(4) Estimated by applying a labour force participation rate of 68% to an extrapolated 1983 population for the Region for ages 15 and over (see page 23-29 for a discussion of labour force participation rates).

(5) Derived from labour force by applying an average provincial unemployment rate.

(6) Derived from labour force by applying an estimated regional unemployment rate from Statistics Canada's Labour Force Survey. Because of the small sample of the labour force taken by Statistics Canada for the Kitchener C.M.A., local unemployment statistics have fluctuated widely in the past. Provincial unemployment rates are more accurate, thus, these rates have been used as a guideline in this report.

The link between economic activity and net migration levels is more evident when specific time periods are examined. For example, between 1976 and 1981 when an estimated 7,158 jobs were created in this Region, net migration totalled only 3,103 people. In the previous five year period, 1971 to 1976, when the number of jobs created totalled 27,296 jobs, net migration was 23,375 people. This relationship between economic activity and migration is more clearly shown in Figure 3.

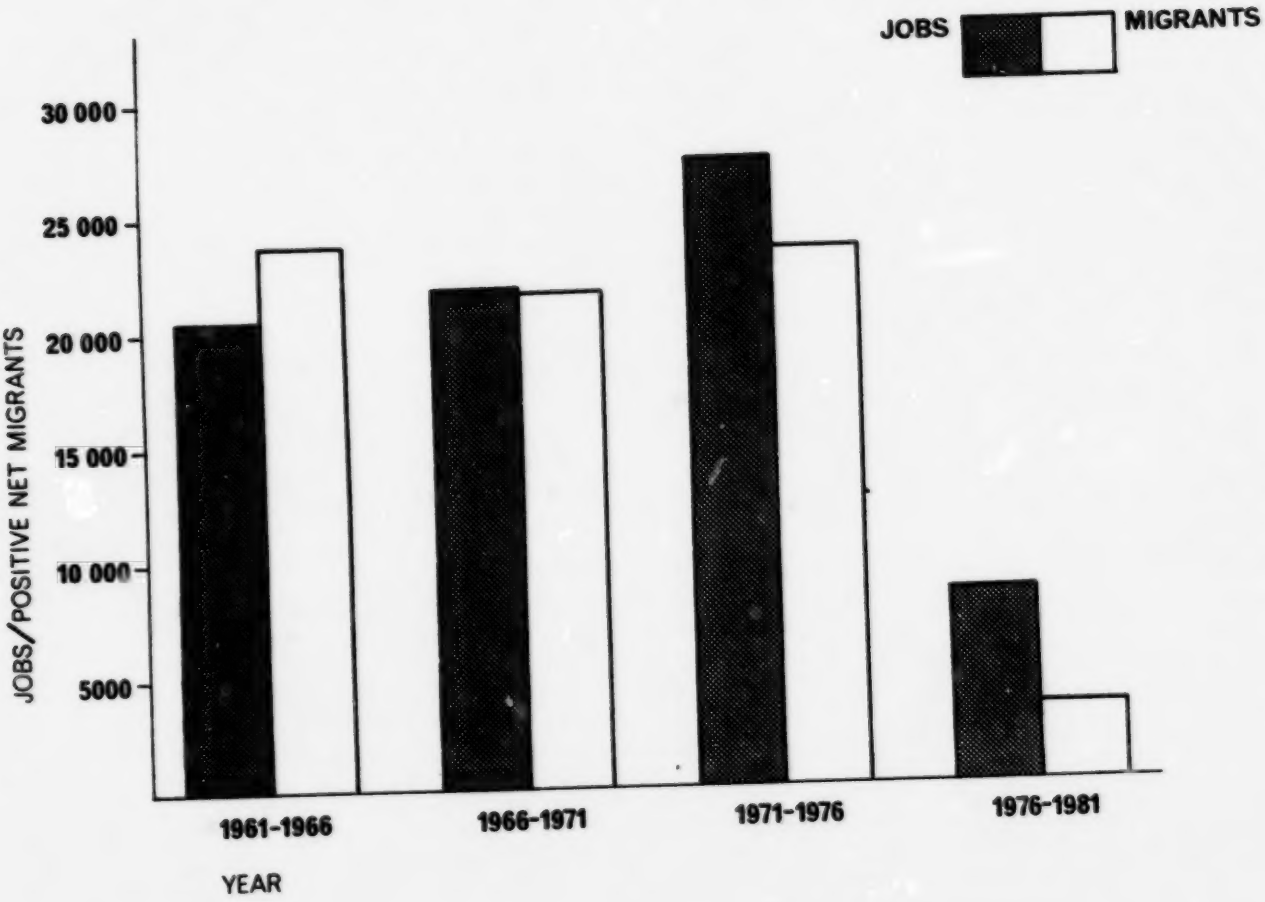
Since 1981 it is estimated that there has been a net loss of 2,746 jobs in this Region due to the present economic recession. It should be noted that in actual figures, more jobs than this have been lost but these jobs have been offset by new jobs created. In measuring incremental change in employment, the total number of jobs which have been lost in the Region due to the recession is probably closer to 10,000 jobs. From 1981 to 1983 the Region's unemployment rate has risen from 8.0% of our labour force to approximately 12.5% in late spring. Because similar unemployment rates exist throughout the country, the Region has not experienced a significant out migration because of this loss of jobs. Rather this loss in jobs has manifested itself in a higher number of people unemployed. *In early 1983 there was an estimated 20,381 people unemployed in this Region compared to an estimated 12,645 people, on average, in 1981.* During this recession the Region has lost an estimated 6.3% of the jobs that existed in 1981, excluding jobs created. This compares to 5.5% in Canada.

Many of the jobs that have been lost in this Region over the past few years have been lost permanently. In the textile and footwear industries, for example, increased foreign competition has resulted in plant closures and reductions in labour force. Many of the firms in these industrial sectors are changing production processes, putting a greater emphasis on capital equipment and less on labour. In the long run, this will improve the competitive position of these firms and reduce the total number of jobs that would have been lost without capital investment. The appliance and furniture industries have also experienced plant closures and layoffs. Much of this may be due to an over-capacity in these industries which has resulted in industry rationalization. Some of the other jobs which have been lost in the automotive industry, metal fabricating and machinery production will likely return as the economy improves.

In this paper we assume that half of the net jobs lost between 1981 and 1983 will be lost permanently because of these structural changes. (e.g. changes in production processes, government regulation, over capacity, etc.). The remaining 1,400 jobs will return once the economy improves.

Figure 3

COMPARISON OF INCREMENTAL CHANGE IN EMPLOYMENT AND NET MIGRATION



Source: 1) Migration - 1961-1976 Province of Ontario Estimates
- 1976-1981 Statistics Canada, Taxfile Information for the Region of Waterloo

2) Employment - See Table 8

To maintain the Region's forecasted natural population increase of 358,953 people by 2001, and to lower the Region's unemployment rate, a great many jobs have to be created in this area. The number of jobs created would have to be higher than in the past for an equivalent population because of the increasing number of females working and the greater proportion of the Region's population in age groups with a higher incidence of working. To derive employment levels for our natural population increase we must first have a forecast of labour force participation rates for males and females and a forecast of unemployment levels.

1) Labour Force Participation Rates

Labour force participation rate refers to that percentage of the population 15 and over, who work full or parttime or who are actively searching for work. For this Region the participation rate for the total population over fifteen years of age was 65.9% in 1976, and has risen to approximately 68% in 1983. Of course as we have previously pointed out, approximately 12.5% of this labour force is presently unemployed.

For our purposes it is more meaningful to look at age specific labour force participation rates. This allows us to not only forecast male and female labour force participation rates but to include specific trends such as early retirement, an increase in the number of young people going back to school, etc. in our forecast.

a) Historical Labour Force Participation Rates

Historical labour force participation rates for specific age groups, both male and female are available for the Region of Waterloo for 1971 and 1976 from census material. The 1961 labour force participation rate for this area can also be estimated from available city data. Figures 4 and 5 show historical labour force participation rates for specific age groups from 1961 to 1976. Several trends can be generalized from this historical data.

Male Labour Force Participation Rates 1961-1976

1. The labour force participation rate for the age group 15-19 increased constantly and significantly from 1961 to 1976.

2. Male labour force participation rates decreased marginally for all age groups between 20 and 64 years of age.

3. The labour force participation rate for the age group 65+ decreased significantly from 1961 to 1976.

Female Labour Force Participation Rates 1961-1976

1. Female labour force participation rates increased significantly for all age groups under 55 years of age up until 1976.

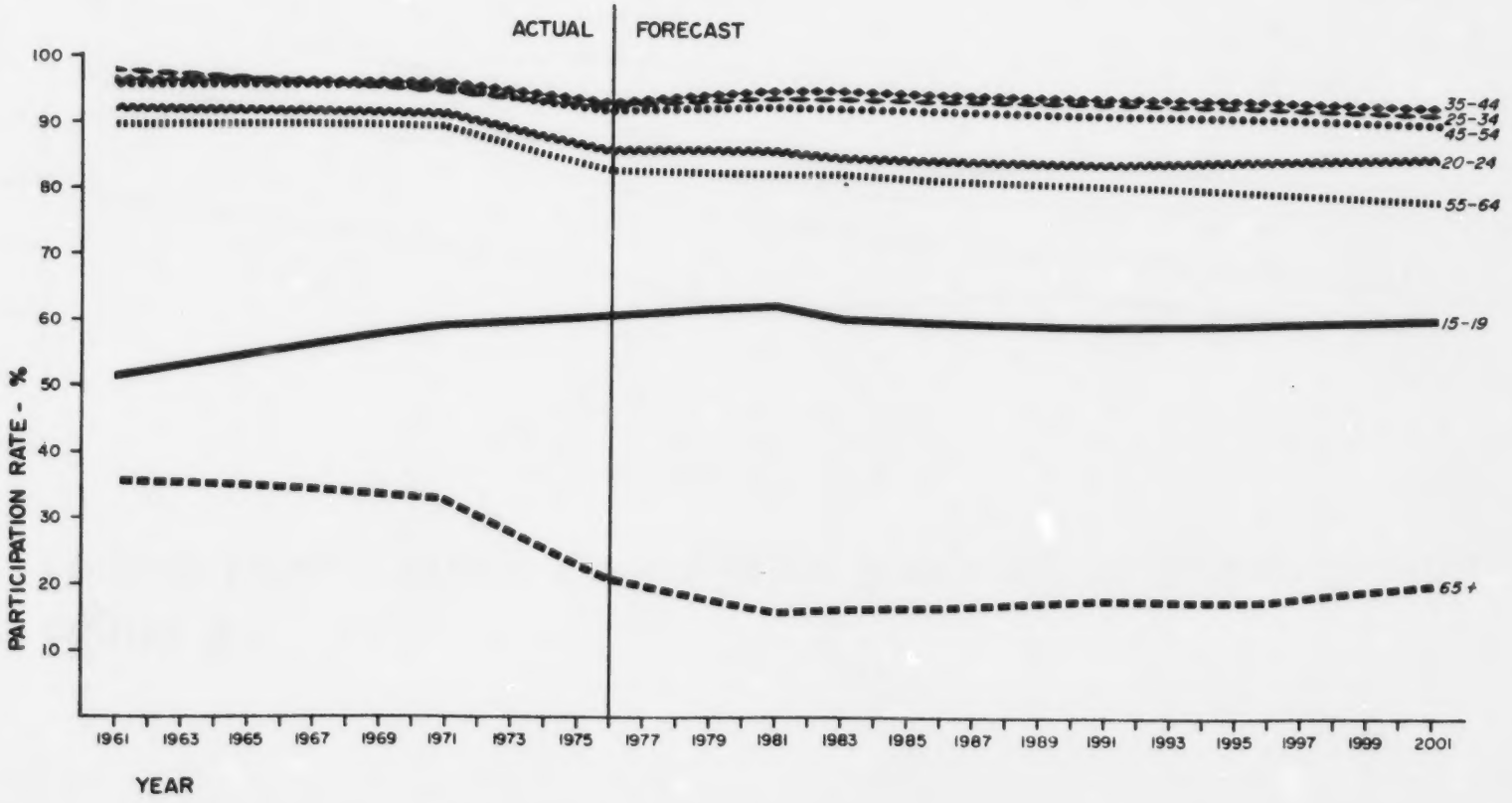
2. Female labour force participation rates declined slightly for age groups over 55 years of age between 1971 and 1976.

Local statistics on labour force participation rates are not available past 1976. *It is probable, however, that labour force participation rates locally moved in similar directions as provincial labour force participation rates, which are available to April, 1983 from Statistics Canada's Employment Survey. This assumption has been made in this paper.* From 1976-1981 there was very little change in provincial labour force participation rates. The age groups 20-24 and 65+ were the only age groups to experience a decrease in labour force participation rates, however modest. Since 1981, however, labour force participation rates have declined for all male age groups particularly those less than 25 years of age. Female labour force participation rates have continued to rise for most age groups, despite the economic recession. These increases were substantial for age groups between 25 and 55 years of age between 1976 and 1981. Between 1981 and 1983 the increases in female labour force participation rates have been more modest and for the age group 15-19 no change has been recorded. These trends are reflected on the age specific labour force participation curves shown in Figures 4 and 5.

b) Forecast of Labour Force Participation Rates

Two alternative forecast of age specific labour force participation rates were developed for this study. Scenario 1 which is presented here was developed by the Waterloo Regional Department of Planning and Development and takes into account past trends and the current economic recession. Scenario 2 which is adapted from a provincial report - Ontario Labour Force Projections 1976-2001 - is presented in Appendix A of this report. *Scenario 1 was selected as the preferred alternative since changes in labour force participation rates more closely approximates recent trends and reflects expected future economic conditions.*

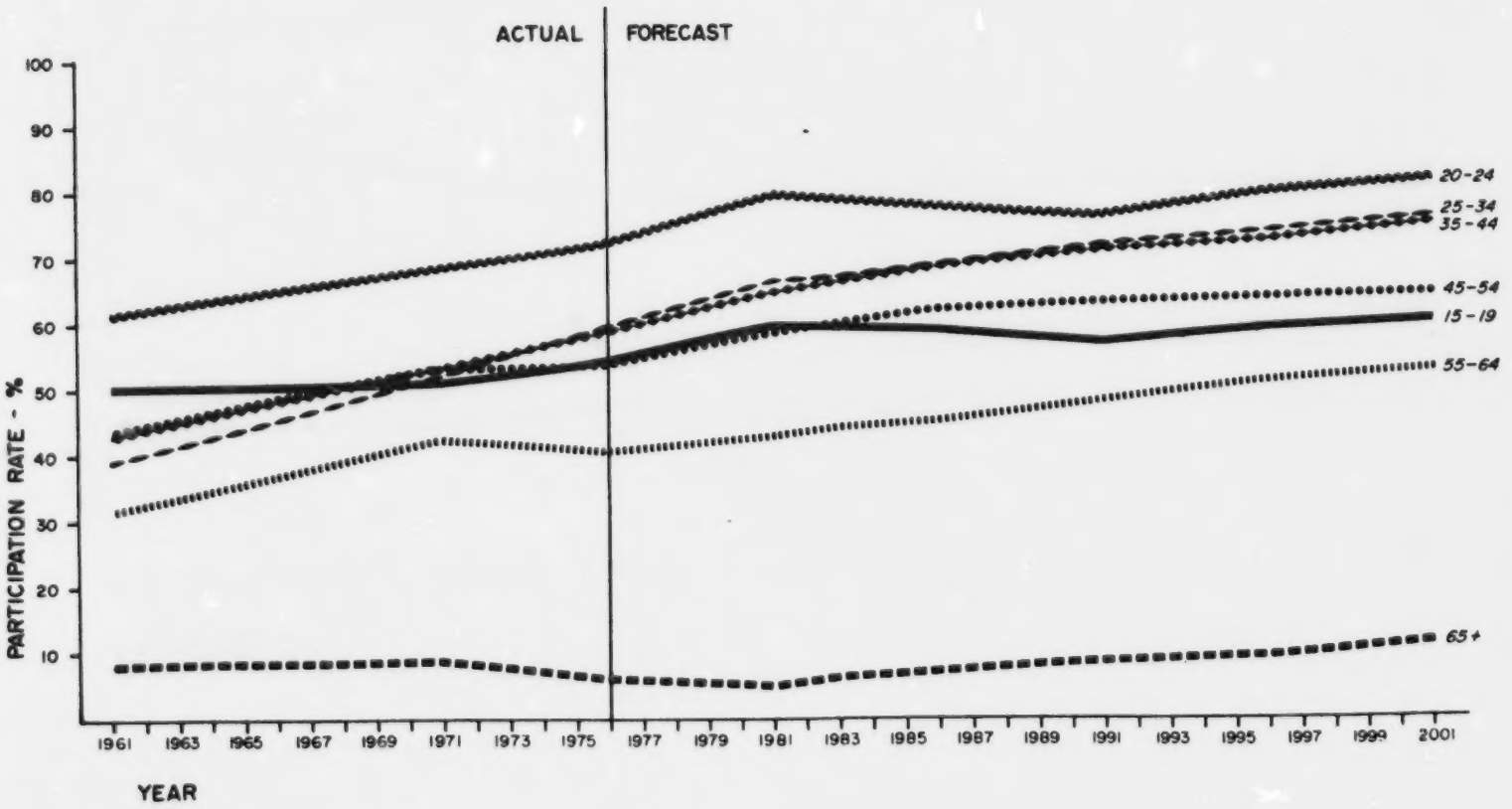
Figure 4:
Male Labour Force Participation Rates for Waterloo Region



Source: 1961-1976: Census, Occupations

Figure 4

Figure 5:
Female Labour Force Participation Rates for Waterloo Region



Source: 1961-1976: Census, Occupations

Figure 5

In Scenario 1 a gradual improvement in the economy is anticipated from 1983 to 1991, and significant improvements thereafter. Despite these improvements, unemployment levels are exepcted to stay high until 1991, particularly for those in age groups below 25 years of age. Age specific labour force participation rates for Scenario 1 are shown in Table 9 and are depicted as well in Figures 4 and 5, pages 25 and 26.

Scenario 1 can be summarized as follows:

Male Labour Force Participation Rates

1. 15-24 Age Group: A decline in labour force participation rates to 1991 due to a high unemployment rate, and a growing need for job training and education. A small increase in participation rates from 1991 to 2001 due to increased job opportunities.

2. 25-54 Age Group: A continuous and constant rate of decrease from 1981 to 2001 as a result of job retraining, improved pensions, workmen's compensation and disability benefits, and participation of the spouse in the labour force.

3. 55 and Over Age Group: A continuous and constant decrease in labour force participation rates for the age group 55-64 years of age as a result of early retirement. For age groups over 65 years of age an increase in labour participation is expected because of legislative changes which prohibits discrimination on the basis of age.

Female Labour Force Participation Rates

1. 15-24 Age Group: A decline in labour force participation rates to 1991 because of high unemployment rates. A small increase in participation rates from 1991 to 2001 due to increased job opportunities.

2. 25-54 Age Group: A variable rate of increase between 1981-2001, with significant increases for all age groups.

3. 55 and Over Age Group: A continuous and constant rate of increase from 1981 to 2001 because of improving job opportunities for women and because of legislative changes which prohibits discrimination on the basis of age.

Table 9

Scenario 1 Forecast of Labour Participation Rates

Region of Waterloo

1981 - 2001

MALE						
	1981	1983	1986	1991	1996	2001
15 - 19	63.0	60.5	60.0	59.5	60.0	61.0
20 - 24	87.0	86.0	85.5	85.0	85.5	86.5
25 - 34	95.0	95.0	94.5	94.0	93.5	93.0
35 - 44	96.0	96.0	95.5	95.0	94.5	94.0
45 - 54	93.0	93.0	92.5	92.0	91.5	91.0
55 - 64	83.0	83.0	82.0	81.0	80.0	79.0
65+	17.0	17.5	17.75	18.5	19.25	20.0

FEMALE						
15 - 19	59.8	59.3	59.0	58.5	59.5	60.5
20 - 24	79.6	79.0	78.6	78.1	80.0	82.0
25 - 34	67.0	68.5	69.5	72.0	74.5	77.0
35 - 44	66.2	68.2	68.7	71.2	73.7	76.2
45 - 54	58.3	61.0	62.3	63.3	64.3	65.3
55 - 64	43.5	44.7	46.0	48.5	51.0	53.5
65+	5.0	6.0	6.5	8.0	9.5	11.0

These participation levels along with a forecast of unemployment rates are applied below to a) our natural population increase and b) alternative migration options in order to obtain the job creation levels necessary to support alternative population levels.

2) Forecast of Unemployment Rates

Recent economic forecasts by the Economic Council of Canada, the Conference Board of Canada and the Federal Government have predicted high unemployment rates until at least the mid-1980's. From these studies it is anticipated that the Region's unemployment rate will gradually decline to around 10% by 1986 from the recent 12.5% rate. After 1986 unemployment rates are expected to continue to decline. Because no institutional forecasts are available to the year 2001, we assume, therefore, a gradual decrease in the unemployment rate to 8% by 1991, 7% by 1996 and 6.5% by the year 2001. This forecast seems reasonable given the structural changes (e.g., improved industrial productivity, decrease in importance of labour intensive industries, job retraining, etc.) which have to occur in the Canadian economy in order to reduce unemployment. Should these structural changes occur more quickly we would expect unemployment rates to drop more than anticipated. There is also speculation that these structural changes may result in permanent high levels of unemployment.

3) Jobs Required to Sustain the Region's Expected Natural Population Increase

By applying these forecasts of labour force participation rates and unemployment rates to our natural population increase, we can estimate the number of jobs which are required to sustain the Region's expected natural population increase. This is shown in Table 10. *Job creation required here is defined as new jobs, not jobs restored as economic circumstances improve.* As previously indicated, we expect that approximately 1,400 of the net jobs lost between 1981 and 1983 are lost permanently. People previously occupying these jobs are accounted for in the number of unemployed. The remainder of the jobs lost between 1981 and 1983 are assumed to be a temporary loss due to cyclical factors, and are expected to return by 1986, as the economy improves. These jobs do not have to be created in the sense of the meaning of job creation in this paper. Here job creation is a result of plant or business expansion or the development of a new firm.

Table 10

Estimated Employment, Region of Waterloo

1981 - 2001

Natural Increase (Zero Net Migration

Labour Force Participation Rate Scenario: 1

		1981	1983	1986	1991	1996	2001
Population 15 and Over	Male	113,360	116,712	122,274	129,761	135,879	141,537
	Female	119,580	123,033	128,948	136,807	143,622	149,842
	Total	232,940	239,745	251,222	266,568	279,501	291,379
Labour Force	Male	93,010	93,909	97,670	102,288	105,804	109,039
	Female	66,342	69,114	72,343	76,900	81,552	86,002
	Total	158,059	163,049	170,013	179,188	187,356	195,042
Derived Total Labour Participation Rate	Male	82.1	80.5	79.9	78.8	77.9	77.0
	Female	55.5	56.2	56.1	56.2	56.8	57.4
	Total	68.4	68.0	67.7	67.2	67.3	66.9
Forecasted Unemployment Rate		8.0	12.5	10.0	8.0	7.0	6.5
Estimated Unemployment		12,645	20,381	17,017	14,356	13,147	12,723
Derived Total Employment		145,414	142,668	153,154	165,091	174,667	183,017
Net Change in Employment			-2,746	10,486	11,937	9,576	8,350
Job Creation (2) Activity Required per Annum		-	-	(1) 3,038	2,387	1,915	1,670

(1) In the period 1983-86 we expect that 1,400 of the net jobs lost between 1981-83 will be restored. In this report this is not considered to be new jobs and therefore no job creation activity is required to restore these jobs.

(2) The required job creation shown in this Table is necessary to sustain our expected natural population increase, assuming zero net migration. If these number of jobs cannot be created then (a) we will experience migration out of this Region and our population forecast will be less and/or (b) our unemployment rate will be higher than forecasted. In the following section we examine four migration options, some which show the Region as having negative net migration in the period 1983-1986.

The annual level of job creation required to sustain our expected natural population increase between 1983 and 1986 is 3,038 jobs. This assumes a decrease in the unemployment rate to 10.0% by 1986 and changes in labour force participation rates outlined in Scenario 1, page 24. For the unemployment rate to drop further additional jobs would have to be created or net migration out of the Region would have to occur. After 1986 the number of jobs created decreases progressively for each five year period to a low of 1,670 jobs per annum in the period 1996-2001. The decline is attributable to changes in the age structure of the Region's population, which has fewer people entering the labour force.

The 3,038 jobs required per annum between 1983 and 1986 is significantly above the average of 1,431 jobs per annum created between 1976 and 1981. During this latter period, however, there was a recognized shortage of industrial land in Kitchener which was responsible to a large extent for the drop in industries locating in this area. Prior to 1976, over 4,500 jobs per annum had been created in this Region since 1961. This suggests that the Region has the potential to attract more industries than it has shown in the recent past. In the following section we consider four alternative job creation options, which can be directly translated into alternative population levels. These options result in different levels of net migration which are based on different economic assumptions.

4) Net Migration and Jobs Required to Sustain the Population

At the beginning of this paper we indicated the difficulties in forecasting net migration into this area. We established the link between economic activity and net migration. Rather than a forecast of net migration based on migration trends only, it is suggested that jobs required to support a definable population be developed. The purpose of this section is to examine four job creation options. Some of these options, as we will discuss, could lead to negative net migration from the Region in specific time periods, and others to significant positive net migration due to economic statistics.

Table 11 shows the four options plus the jobs required for our forecasted natural population increase (zero net migration). *Options 1 and 2 show fewer jobs being created per annum in the period 1983-1986 than required to sustain our natural population increase, meaning negative net migration during this period. Options 3 and 4 have more jobs being created in this period than the 3,038 jobs per annum required to sustain our natural population increase.* The migration levels associated with each of these options are shown in Table 12.

Table 11

Jobs Required to Sustain Population Forecasts
Averaged Annually for Selected Periods

Job Creation Option	1983-1986	1986-1991	1991-1996	1996-2001	Average
Natural Increase	3,038	2,387	1,915	1,670	2,165
Option 1	2,000	2,500	2,750	3,000	2,625
Option 2	**2,800**	**3,000**	**3,200**	**3,500**	**3,161**
Option 3	3,200	3,300	3,400	3,600	3,394
Option 4	3,300	3,500	3,700	4,000	3,661

Recommended Option

Assumptions

In using these job creation/economic opportunity options to help determine net migration populations, we make assumptions on unemployment rates, labour force participation rates and economic opportunities promotion.

1. That the unemployment rate forecast shown in Table 10 is realistic and that local unemployment rates will gradually decline to around 10.0% of the labour force in 1986, 8.0% in 1991, 7.0% in 1996 and 6.5% in 2001.

2. The labour force participation rates for both males and females shown in Table 9, pp. 28 will apply.

3. That economic opportunities and increased promotion in the Regional context could be sufficient to reach the required jobs to sustain the forecasted growth.

Table 12

Net Migration Levels Related to Alternative Population Forecasts

Job Creation Option	1983-1986	1986-1991	1991-1996	1996-2001
Natural Population Increase	0	0	0	0
Option 1	-6,450	1,690	6,400	10,130
Option 2	**-1,521**	**5,030**	**9,480**	**13,096**
Option 3	880	7,175	10,800	12,790
Option 4	1,454	8,700	12,900	16,440

Recommended Option

Job creation activity in all of the options is lowest in the first period 1983-1986 and highest in the last period, 1996-2001. The Region's 2001 population arising from these options are: Option 1 - 371,788 people, Option 2 - 390,440 people, Option 3 - 398,007 people, and Option 4 - 407,661. These forecasted populations are shown for each of the horizon years between 1981 and 2001 on Table 13.

Compared to recent job creation activity in the Region, Options 3 and 4 appear to be too optimistic. It is unlikely that the number of new jobs created between 1983 and 1986 would be more than double the 1,431 jobs created per annum between 1976 and 1981. Options 1 and 2 in this respect appear more reasonable. *Job Creation Option 2 is recommended.* This option has a certain amount of optimism built into it. This option assumes that a greater choice of industrial land will become available in Kitchener and continue to be good in other municipalities in the Region. Also this option assumes that industrial promotion on a region-wide scale will be successful in attracting more industry to this area, and encouraging existing industry to remain in this area. Without these changes, it is probable that fewer jobs will be created. The Region will experience a greater amount of out migration, higher unemployment or both.

The jobs created in Option 2* are not all created by new industry. Many of these jobs will be created by existing industry and the service sector. In fact, it is likely that of the 57,000 jobs expected to be created between 1983 and 2001 in Option 2, only half of those jobs, 28,500 jobs, will be "basic type"** jobs which export goods and services. The remaining jobs will be in the service sector and in support industries. It is the "basic type jobs", jobs which export goods and services, which need industrial promotion efforts. The non-basic type jobs will come as a consequence of our success in developing an industrial base which exports goods and services.

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* It should also be remembered that when we are talking about job creation, we are referring to new jobs, not jobs which arise because of recalls on former layoffs. Jobs created are in addition to these.

** Basic type jobs are those jobs which bring funds into the Region from outside, in other words, these are jobs geared to export. This includes manufacturing jobs, major insurance companies, the majority of university employees, etc. In a regional economy such as ours, these jobs are necessary for future growth to occur.

Table 13

Alternative Population Levels for the

Region of Waterloo

Corresponding to the Alternative Number of Jobs Required

	1981	1986	1991	1996	2001
Natural Increase	305,490	322,046	337,299	349,859	358,953
Option 1	305,490	314,681	331,049	350,554	371,788
Option 2	**305,490**	**320,309**	**341,121**	**364,973**	**390,440**
Option 3	305,490	323,051	346,583	372,392	398,007
Option 4	305,490	323,706	349,047	377,482	407,661

Recommended Option

Table 14 shows the population distribution by municipality for job creation Option 2. Of importance is the dramatic decline in anticipated municipal population in the year 2001 from previous forecasts. The 1980 municipal forecast is shown in Appendix C. This is entirely explained by a more realistic job creation target for the Region, which results in lower levels of migration into the Region. Table 15 shows municipal population targets including students.

The population forecast established here has important implications for municipal services and private investment. These factors are discussed in the following section.

E. IMPLICATIONS

The revised population forecast will become the basis for the Region's Transportation Plan Update, future estimates of housing needs and land supply, serve as a guideline for determining future water requirements and horizon years for sewage treatment plant capacities, be used by school boards and social agencies to plan programs, play an important part in private investment decisions, and could serve as a target for job creation. Future Regional reports on transportation needs, sewer capacities and water needs, and housing needs will illustrate the specific implications of the revised population levels in these areas.

1) Required Number of Jobs to Support Population Forecasts

57,000 jobs are required to sustain the Region's 2001 population forecast of 390,440 people. This will be met by jobs created by existing local industry and firms and by the location of new firms in this Region.

Table 14

Population Forecast (Without Students)*

Regional Municipality of Waterloo

Municipalities	1981	1986	1991	1996	2001
Kitchener	139,735	146,416	155,790	166,540	178,041
Waterloo	49,430	53,474	59,150	65,658	72,622
Cambridge	77,170	81,145	86,719	93,116	99,953
Woolwich	16,490	16,555	16,647	16,751	16,862
Wilmot	10,925	10,942	10,961	10,983	11,006
Wellesley	6,770	6,791	6,818	6,848	6,880
North Dumfries	4,965	4,986	5,013	5,043	5,076
Region	305,490	320,309	341,098	364,936	390,440

* Students from outside the Region who are living off campus at the area's two universities and Conestoga College are not included in this Forecast Population. Based on a 1980 survey of off campus students and projected university and college enrollment, an estimated 2,458 students need to be added to Kitchener's population and 10,216 students to Waterloo's population to account for non-resident students living off campus.

Table 15

Population Forecast (With Students)*

Regional Municipality of Waterloo

Municipalities	1981	1986	1991	1996	2001
Kitchener	142,193	148,847	158,248	168,998	180,499
Waterloo	59,646	63,690	69,366	75,874	82,838
Cambridge	77,170	81,145	86,719	93,113	99,953
Woolwich	16,490	16,555	16,647	16,751	16,862
Wilmot	10,925	10,942	10,961	10,983	
Wellesley	6,770	6,791	6,818	6,848	6,880
North Dumfries	4,965	4,986	5,013	5,043	5,076
Region	318,164	332,983	353,722	377,610	403,114

* In 1980 a sample survey of students was undertaken by Regional staff to determine place of residence. Since very little change in student enrollment is anticipated at the area's college and universities, this survey information is still relevant. Based on this survey an additional population of 2,458 students has been added to the City of Kitchener population and 10,216 students to the City of Waterloo.

Of the 28,500 "basic type jobs", i.e., jobs which export goods and services, it is likely that between 40% and 60% of these jobs will have to be created by investment in new industries.* The remaining jobs would be created by expansion of local industry. Table 16 provides a high (60%) - low (40%) range for basic type jobs that are required to sustain our population forecast. In addition to these jobs, continued expansion of local industry would be expected to create additional jobs to sustain the expected net migration figure forming part of the population forecast.

In a future report by the Regional Department of Planning and Development, an industrial development strategy which discusses job creation will be developed for discussion. This study will be based on surveys of local industry to define market opportunities (with the help and co-operation of the business and investment community), as well as to more clearly define the division of basic and non-basic industry in the Region.

Because of the close links between economic conditions and job creation and population forecasts it is important for the Waterloo Regional Department of Planning and Development to monitor both population and job creation statistics. Skills required, and re-education and retraining of the unemployed will also be an important issue. To monitor these factors requires the support of each municipal industrial promotion agency and others. *If we cannot meet the required number of jobs to support the 1981 to 2001 population forecast, either (a) economic opportunities have to be increased and improved or (b) we must revise our population forecasts even further downward.*

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* Non-basic type jobs such as retail, service firms and firms which manufacture for local markets should develop in this area as a consequence of reaching our target of 28,500 basic type jobs by 2001. The ratio of one non-basic job for every basic job for a Region the size of ours is supported by work done by E.L. Ullman (1969) and C.M. Tiebout (1957). For any one industry this ratio could be much greater or even less depending on local linkages. This was discussed on page 34 of this report.

Table 16

Basic Type Jobs Required Annually

From Investment in New Industry *

The Region of Waterloo

	1983-1986	1986-1991	1991-1996	1996-2001
High (60% of Basic Type Jobs)	840	900	960	1,050
Low (40% of Basic Type Jobs)	560	600	640	700

* See Option 2, Table 13

2) School Enrollment

To have an effective and efficient capital spending program school boards require a reliable forecast of population growth. The preferred population forecast presented in this report shows a decline in the proportion of school aged children 5-19, from 25.7% of the Region's population in 1981 to 19.3% of the Region's population by 2001. *Absolute numbers for elementary school enrollment will stay relatively constant between 1981 and 2001, 49,340 children between the ages of 5 and 14 in 1981 compared to 50,181 in 2001; but will decline for secondary schools from 28,620 people in 1981 to 25, 229 people between 15-19 years of age in 2001. These figures suggest that existing school capacities are sufficient to handle school enrollment for both elementary and secondary school students to the year 2001.* This does not, however, take into account locational disadvantages of existing schools, and outdated facilities of existing schools which may necessitate new school construction in some developing neighbourhoods. In addition, demand for new facilities may arise because of emergency need for adult education facilities and facilities for job retraining.

In Appendix C of this report we provide population pyramids for each of the horizon years for which population growth is targeted. These diagrams show changes in the relative proportion of the Region's population for each age group.

3) Social Programs

The most obvious social implication of the preferred population forecast is the absolute and relative growth of the Region's senior citizen population between 1981 and 2001. *By 2001 the senior citizen population is expected to increase from 27, 239 people to almost double that amount, to 52,543 people.* In Appendix C, the diagrams show that the senior citizen population will comprise 13.6% of the Region's population in 2001 compared to 9.1% in 1981.

The large growth in the size of the senior citizen population by 2001 requires that social planning groups anticipate such growth and plan for it. Home services such as nursing care, snow shovelling, housekeeping, meals, etc., will have to be expanded as will medical and senior citizen care facilities. These needs should become a high priority for funding of future social service programs.

The absolute numbers for pre-school children is expected to change only marginally from 23,220 children in 1981 to 24,446 in 2001. This slight increase in numbers should temper the growth in demand for daycare facilities, which is expected to increase because of a rise in the number of working mothers and single parents. To measure the changing needs for daycare facilities it is necessary to monitor not only population but also labour participation rates of females and changes in the number of single parent families.

4) Private Investment

In the past regional population forecasts have been used in market studies for retail establishments, in a variety of housing projects and in some industrial location studies. The variability of the Region's migration levels has created some problems for private investors, particularly land development companies and house builders. The Region presently has sufficient land in the development process to accommodate growth to the mid 1990's and within the Settlement Policy Areas sufficient land to accommodate an additional 200,000 people above our 2001 target population. Such a supply keeps land prices in check but also results in some negative factors including discontinuous development patterns, vacant housing and retail establishments, a high level of public capital expenditure compared to growth, and frequent bankruptcies in the land development and housing industries.

Investment decisions not only for private companies but also for public capital expenditures require more reliable information on population growth. By monitoring demographic factors affecting population growth, we should be able to improve the reliability of population information and forecasting. This information should also be used in land use planning related decisions.

5) Public Investment

Within the settlement areas identified in the Regional Official Policies Plan sufficient area is provided to accommodate a Regional population of approximately 600,000 people. By the year 2001 our population is expected to number just less than 400,000 people. Despite this decline in anticipated growth, we are still allowing communities to develop to the limits of our settlement boundaries. Many of the communities, because of our lower population growth rates, will

only be partially developed by the year 2001. Nevertheless, public expenditures will have been made and capacity commitments allocated to accommodate the total development. *Substantial cost savings in capital works may be possible by restricting growth within our defined settlement boundaries and focussing on existing approved communities within municipal official plans which can accommodate our forecasted population growth. This requires examination of our present planning review process to determine if an oversupply of developable land is of regional significance because of required capital expenditures.* This becomes even more important as rising costs for education, job retraining, social programs, unemployment, economic opportunities promotion etc., requires a greater share of public expenditure.

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PERSONNEL COMMUNICATIONS

The following people responded to a first draft of this population and employment report. Their comments have been extremely valuable in making refinements to the report and their time and effort is much appreciated.

1. Dr. Susan McDaniel, Department of Sociology, University of Waterloo, Waterloo, Ontario

2. Dr. M.V. George, Chief, Population Projections Section, Demography Division, Social Statistics Field, Statistics Canada

3. John Tylee, Director of Statistical Services Branch, Ministry of Treasury and Economics, Province of Ontario

4. Sandra Tychsen, Research Officer for Labour Economics, Ontario Economic Council.

APPENDIX A

APPENDIX A

FORECAST OF LABOUR FORCE PARTICIPATION RATES SCENARIO 2

Two alternative forecasts of age specific labour force participation rates were developed for this study. Scenario 1, the preferred alternative, was presented in the report and was developed by the Waterloo Regional Department of Planning and Development and takes into account past trends and the current economic recession. Scenario 2 which is adapted from a provincial report - Ontario Labour Force Projections 1976-2001, is reviewed here. In order to adapt the Ontario forecast to the Region of Waterloo the difference between the 1976 Ontario and 1976 Region of Waterloo historical participation rates was calculated and this difference was maintained for the 1981 to 2001 projection period.

Scenario 2 does not take into account the current economic recession and exhibits no decline in labour force participation rates in the 1981-1983 period in contrast to preferred Scenario 1. In general, Scenario 2 assumes more significant increases in labour force participation rates in the 1981-2001 period than does Scenario 1. Age specific labour force participation rates for Scenario 2 are shown on Table 1.

Scenario 2 can be summarized as follows:

Male Labour Force Participation Rates

1. 15-24 Age Group: A steady increase in labour force participation rates to 2001. This does not take into account the impact of the poor economy in the 1981-1983 period.

2. 25-54 Age Group: Remains constant throughout the 1981 to 2001 period

3. 55 and Over Age Group: A steady increase in labour force participation rates to 2001

Female Labour Force Participation Rates

1. 15-24 Age Group: A steady increase in labour force participation rates to 2001

2. 25-54 Age Group: A variable rate of increase between 1981 and 2001. A greater increase is forecast for the age group 25-44 and slightly lower rate of increase for the age group 45-54.

3. 55 and Over Age Group: A continuous and constant rate of increase to 2001. A lower rate of increase is forecast for the 65+ age group in Scenario 2 than that proposed in Scenario 1.

These participation levels along with a forecast of unemployment rates were applied to a) our natural population increase and b) alternative migration options in order to obtain the job creation levels necessary to support alternative population levels.

Table 2 indicates the four job creation options for the 1981 to 2001 period while Table 3 indicates the required net migration levels necessary to support these job creation options. The Region's population resulting from these options are: Option 1 - 363,436 people, Option 2 - 381,651 people, Option 3 - 389,892 people and Option 4 - 398,288 people. For each of the four options the forecast population for Scenario 2 is less than the comparable forecast for Scenario 1.

Table 1

Scenario 2 Forecast of Labour Participation Rates

Region of Waterloo

1981 - 2001

MALE						
	1981	1983	1986	1991	1996	2001
15 - 19	63.0	63.5	64.25	65.5	66.75	68.0
20 - 24	87.0	87.9	87.75	88.5	89.25	90.0
25 - 34	97.0	97.0	97.0	97.0	97.0	97.0
35 - 44	97.5	97.5	97.5	97.5	97.5	97.5
45 - 54	94.5	94.5	94.5	94.5	94.5	94.5
55 - 64	85.0	85.5	86.0	87.0	88.0	89.0
65+	17.0	17.6	18.25	19.5	20.75	22.0

FEMALE						
15 - 19	59.8	60.7	61.05	62.3	63.5	64.8
20 - 24	79.6	80.2	80.85	82.1	83.35	84.6
25 - 34	67.0	68.2	69.5	72.0	74.5	77.0
35 - 44	66.2	67.5	68.7	71.2	73.7	76.2
45 - 54	58.3	60.3	62.3	63.3	64.3	65.3
55 - 64	43.5	44.7	46.0	48.5	51.0	53.5
65+	5.0	5.3	5.5	6.0	6.5	7.0

Source: These trends in labour force participation rates were adapted to this Region from the provincial report Ontario Force Projections 1976-2001, Central Statistical Services, Ministry of Treasury and Economics, January, 1980.

Table 2

Job Creation Options Averaged Annually

For Selected Periods

Job Creation Option	1983-1986	1986-1991	1991-1996	1996-2001	Average
Option 1	2000	2500	2750	3000	2625
Option 2	2800	3000	3200	3500	3161
Option 3	3200	3300	3400	3600	3394
Option 4	3300	3500	3700	4000	3661

Table 3

Net Migration Levels Necessary

To Support Job Creation Activity

Scenario 2

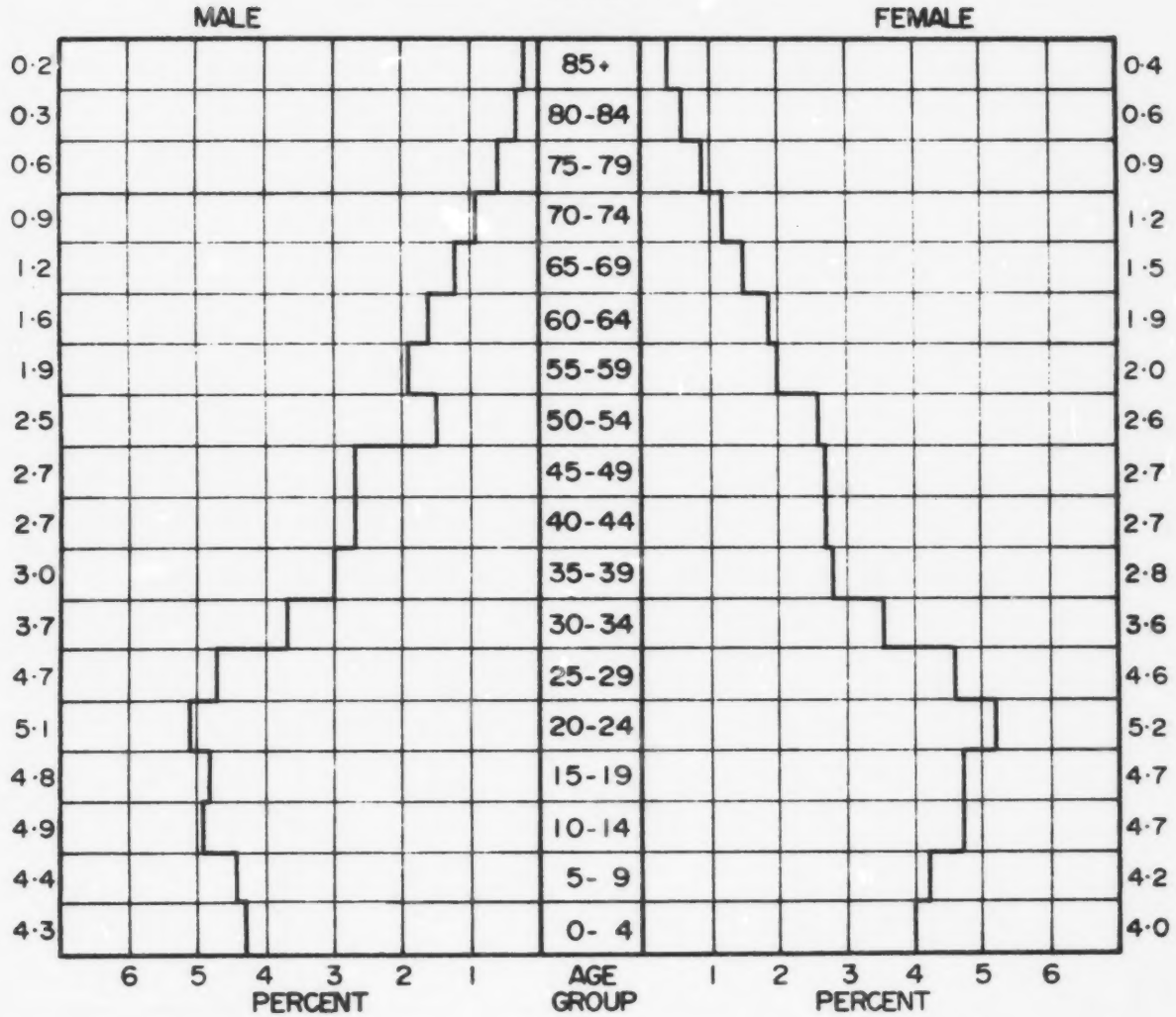
Job Creation Option	1983-1986	1986-1991	1991-1996	1996-2001
Option 1	-9320	0	5560	9250
Option 2	-4600	3350	8532	12,197
Option 3	-2250	5400	10,590	11,840
Option 4	-1626	6950	11,872	15,200

APPENDIX B

REGIONAL MUNICIPALITY OF WATERLOO

AGE/SEX PROFILE

1976[1]

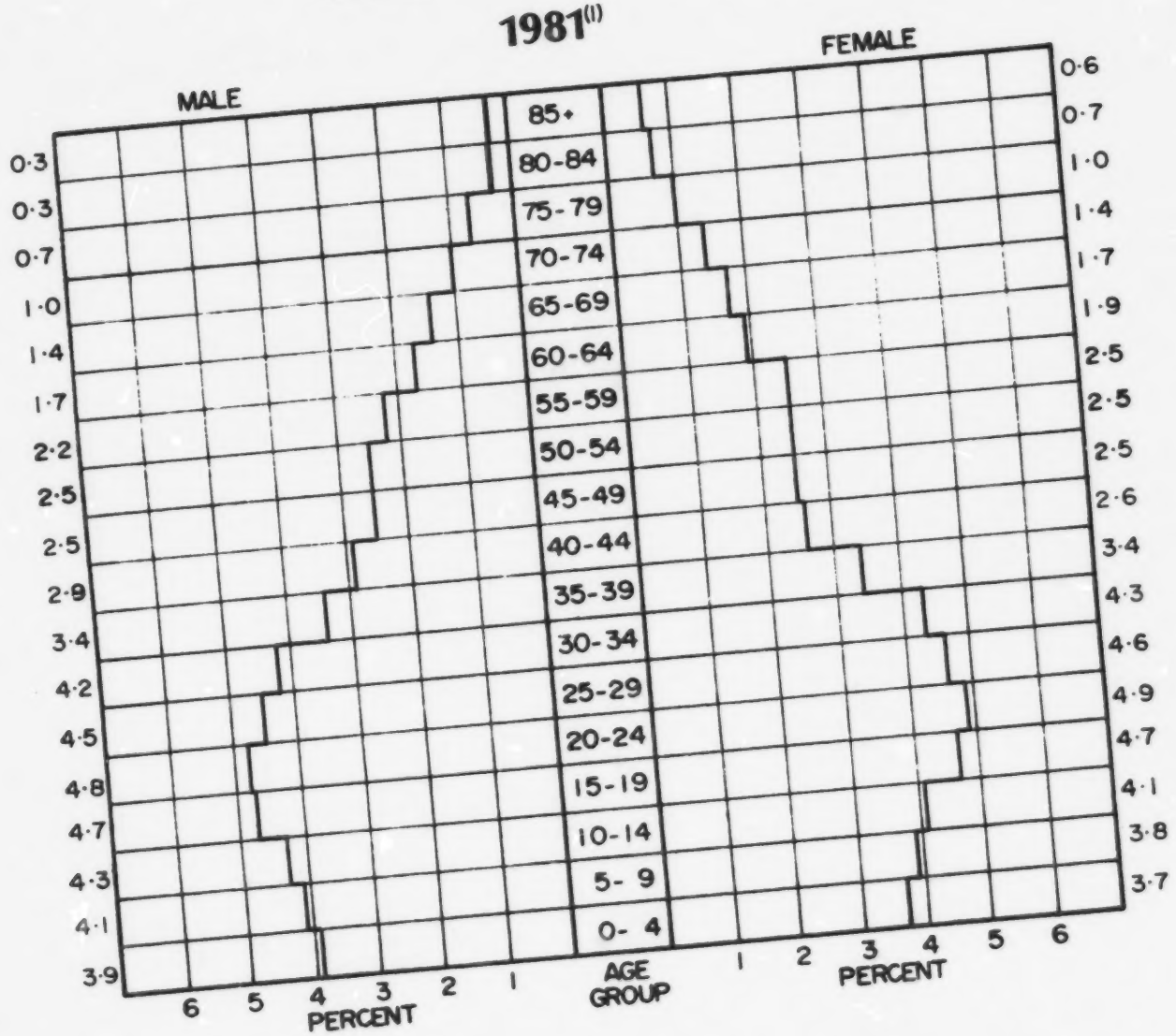


SOURCE: (1) 1976 CENSUS

REGIONAL MUNICIPALITY OF WATERLOO

AGE/SEX PROFILE

1981[1]

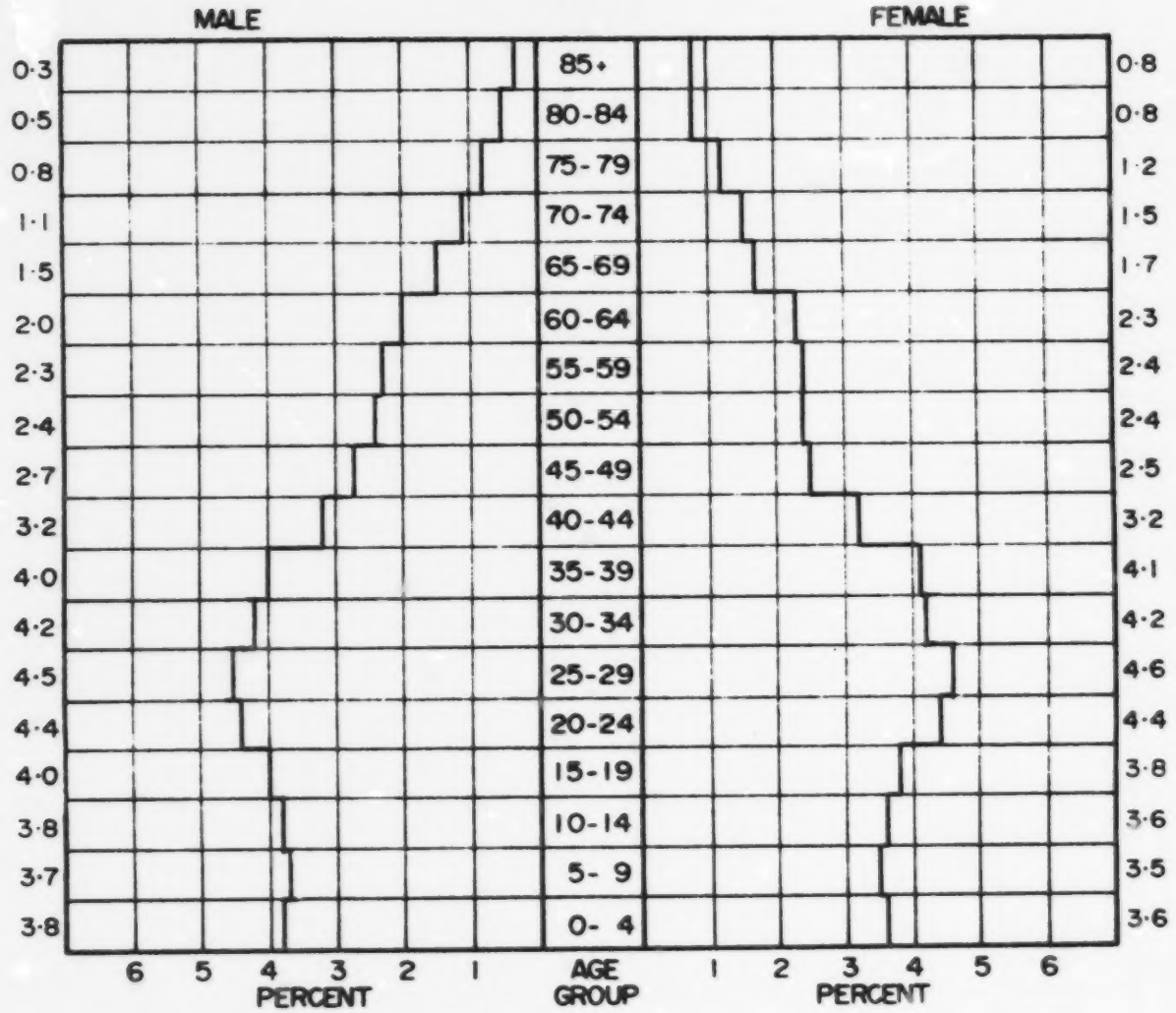


SOURCE: (1) 1981 CENSUS

REGIONAL MUNICIPALITY OF WATERLOO

FORECASTED
AGE/SEX PROFILE

1986[1]

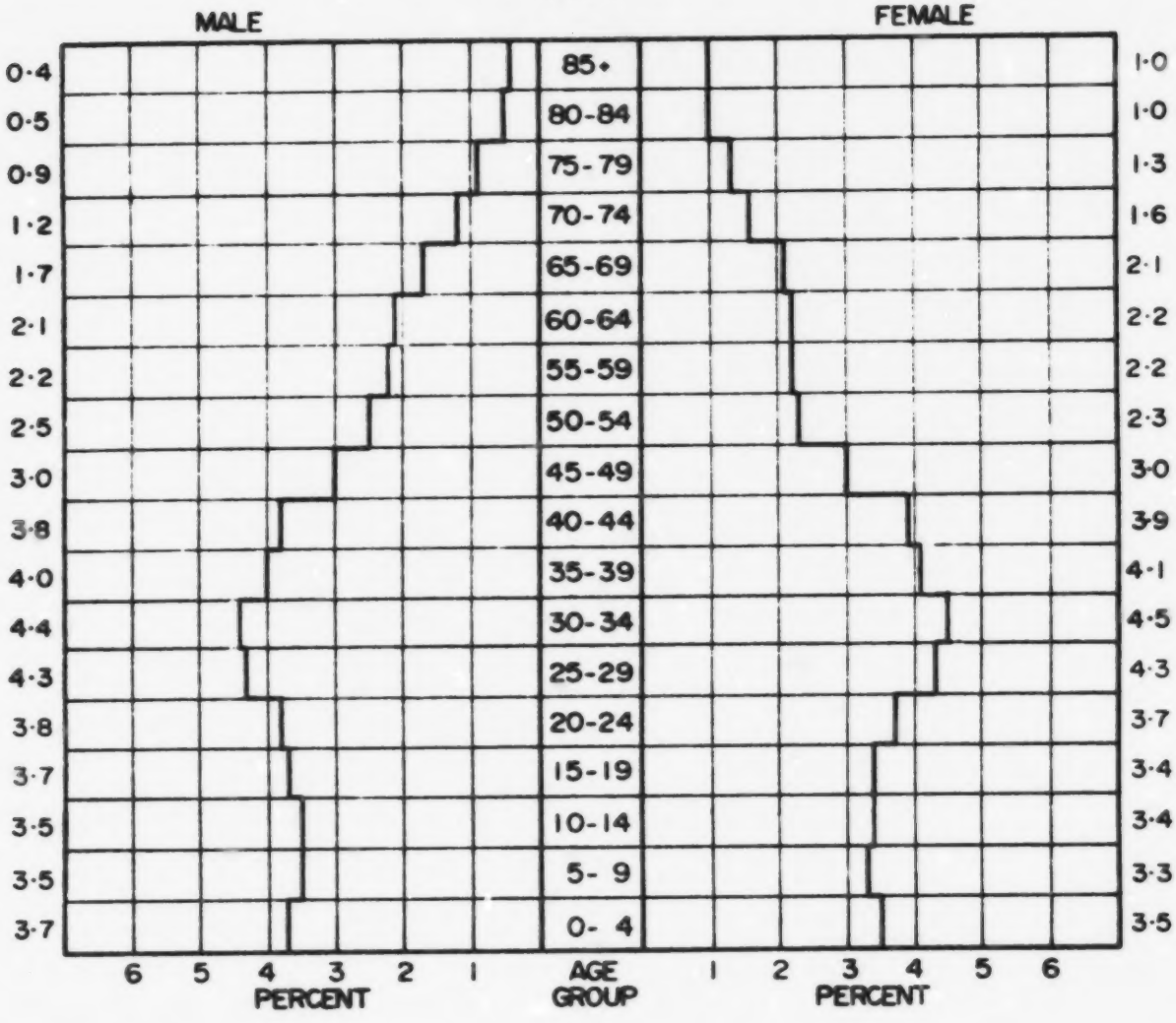


SOURCE: (1) REGIONAL MUNICIPALITY OF WATERLOO, POPULATION FORECAST, 1983.

REGIONAL MUNICIPALITY OF WATERLOO

FORECASTED
AGE/SEX PROFILE

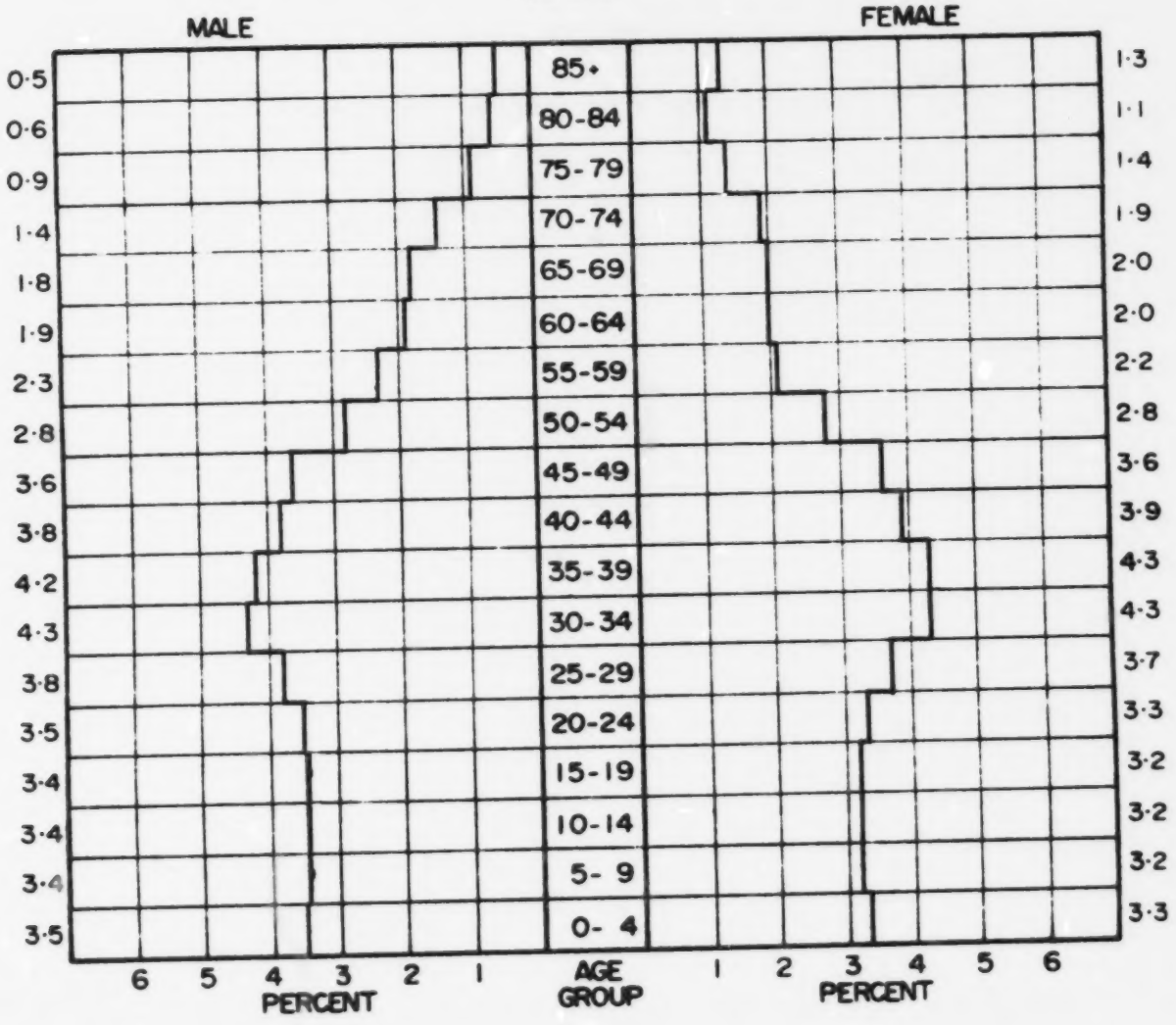
1991[1]



SOURCE: (1) REGIONAL MUNICIPALITY OF WATERLOO, POPULATION FORECAST, 1983

REGIONAL MUNICIPALITY OF WATERLOO

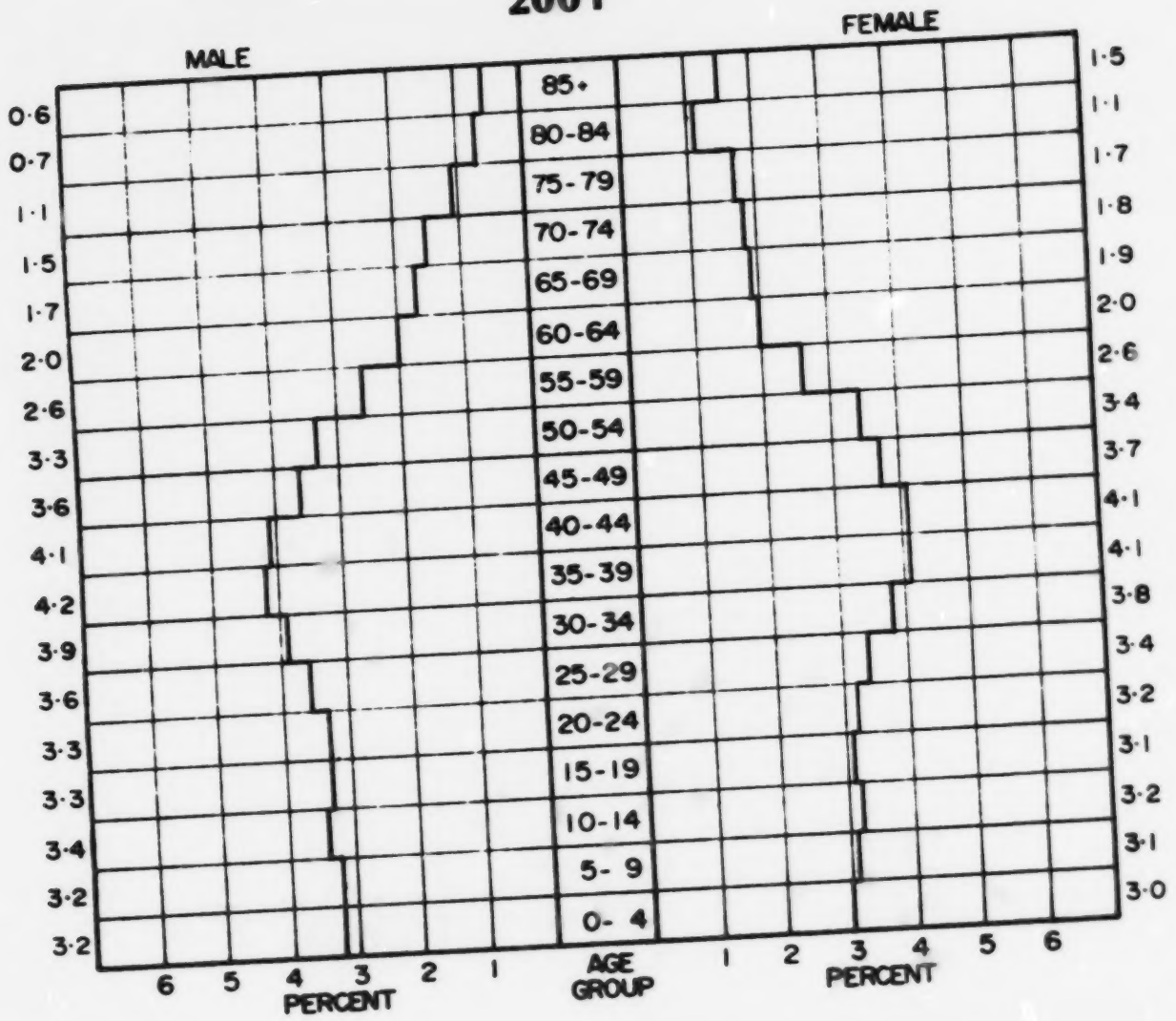
FORECASTED
AGE/SEX PROFILE
1996(1)



SOURCE: (1) REGIONAL MUNICIPALITY OF WATERLOO, POPULATION FORECAST 1983

REGIONAL MUNICIPALITY OF WATERLOO

FORECASTED
AGE/SEX PROFILE
2001



SOURCE: (1) REGIONAL MUNICIPALITY OF WATERLOO, POPULATION FORECAST, 1983.

APPENDIX C

Table 1

Regional Population by Municipality*

1976 - 2001

	1976	1981	1986	1991	1996	2001
Cambridge	72,385	78,662	85,304	95,926	106,421	116,736
Kitchener	131,870	138,826	153,274	172,193	191,032	209,032
Waterloo	46,625	55,645	63,381	71,182	78,970	86,624
North Dumfries	5,054	5,000	5,088	5,328	5,568	5,808
Wellesley	6,415	6,891	7,289	7,884	8,479	9,074
Wilmot	10,560	10,846	11,187	11,847	12,507	13,167
Woolwich	16,240	16,350	16,881	17,886	18,891	19,896
	289,125	312,220	342,404	381,908	421,494	460,462

* Source: Regional PD 22/80, February 27, 1980.

APPENDIX D

POPULATION FORECAST FOR 1986

	MALE	FEMALE	COMBINED
0. TO 4.	12119.	11413.	23532.
5. TO 9.	11835.	11337.	23172.
10. TO 14.	12298.	11401.	23756.
15. TO 19.	12960.	12325.	25285.
20. TO 24.	14272.	14125.	28397.
25. TO 29.	14451.	14787.	29238.
30. TO 34.	13385.	13806.	27192.
35. TO 39.	12823.	13066.	25890.
40. TO 44.	10347.	10236.	20582.
45. TO 49.	8569.	7949.	16518.
50. TO 54.	7566.	7541.	15107.
55. TO 59.	7414.	7605.	15019.
60. TO 64.	6452.	7362.	13814.
65. TO 69.	4753.	5539.	10292.
70. TO 74.	3648.	4885.	8532.
75. TO 79.	2447.	3890.	6337.
80. TO 84.	1463.	2528.	3991.
85. TO 99.	1042.	2609.	3651.

TOTAL POPULATION FORECAST FOR WATERLOO COUNTY 320306.

POPULATION FORECAST FOR 1991

	MALE	FEMALE	COMBINED
0. TO 4.	12574.	11841.	24415.
5. TO 9.	12095.	11391.	23486.
10. TO 14.	12071.	11559.	23631.
15. TO 19.	12459.	11616.	24074.
20. TO 24.	13097.	12539.	25636.
25. TO 29.	14677.	14689.	29366.
30. TO 34.	14923.	15226.	30149.
35. TO 39.	13645.	14027.	27672.
40. TO 44.	12925.	13159.	26084.
45. TO 49.	10328.	10262.	20590.
50. TO 54.	8469.	7939.	16408.
55. TO 59.	7353.	7284.	14637.
60. TO 64.	7059.	7493.	14551.
65. TO 69.	5955.	7179.	13134.
70. TO 74.	4183.	5294.	9477.
75. TO 79.	2993.	4528.	7521.
80. TO 84.	1810.	3384.	5193.
85. TO 99.	1395.	3476.	4871.

TOTAL POPULATION FORECAST FOR WATERLOO COUNTY 341096.

POPULATION FORECAST FOR 1996

	MALE	FEMALE	COMBINED
0. TO 4.	12685.	11946.	24631.
5. TO 9.	12550.	11820.	24369.
10. TO 14.	12549.	11816.	24365.
15. TO 19.	12383.	11860.	24248.
20. TO 24.	12773.	12039.	24812.
25. TO 29.	13938.	13623.	27560.
30. TO 34.	15620.	15536.	31157.
35. TO 39.	15460.	15671.	31132.
40. TO 44.	13911.	14249.	28160.
45. TO 49.	12974.	13250.	26224.
50. TO 54.	10255.	10289.	20544.
55. TO 59.	8262.	7931.	16193.
60. TO 64.	7029.	7435.	14464.
65. TO 69.	6551.	7366.	13916.
70. TO 74.	5202.	6894.	12156.
75. TO 79.	3452.	4955.	8407.
80. TO 84.	2213.	3948.	6162.
85. TO 99.	1708.	4606.	6434.

TOTAL POPULATION FORECAST FOR WATERLOO COUNTY 364936.

POPULATION FORECAST FOR 2001

	MALE	FEMALE	COMBINED
0. TO 4.	12589.	11856.	24446.
5. TO 9.	12662.	11926.	24588.
10. TO 14.	13193.	12439.	25592.
15. TO 19.	12992.	12235.	25227.
20. TO 24.	12846.	12453.	25299.
25. TO 29.	13965.	13542.	27507.
30. TO 34.	15208.	14806.	30073.
35. TO 39.	16386.	16168.	32553.
40. TO 44.	15654.	15993.	31647.
45. TO 49.	14029.	14400.	28429.
50. TO 54.	12900.	13297.	26197.
55. TO 59.	10017.	10289.	20306.
60. TO 64.	7914.	7921.	15835.
65. TO 69.	6560.	7360.	13920.
70. TO 74.	5606.	7109.	12915.
75. TO 79.	4330.	6487.	10817.
80. TO 84.	2533.	4351.	6885.
85. TO 99.	2191.	5815.	8006.

APPENDIX E

APPENDIX E

MUNICIPAL ALLOCATION

The difficulty in forecasting regional population becomes even more precarious when forecasting municipal population. Our region can be identified as an economic region, for which job creation and net migration can be targeted. However, at a municipal level jobs in one city may result in a demand for housing in another. Municipal population in the year 2001 cannot be determined accurately by looking at births, deaths and net migration by each municipality. Rather, it is better to examine past municipal shares of regional growth.

Table 1 shows a comparison of percentage growth of census populations of municipalities from 1971 to 1981. Growth in Kitchener and Cambridge was approximately equal to their share of regional population; 45.7% and 25.3% respectively. Waterloo's share of growth - 22.0% - was significantly higher than the City's share of population - 16.2%. This higher share of growth in Waterloo was at the expense of the Townships, where each Township's share of growth from 1971 to 1981 was less than its share of population.

The allocation of shares of population growth on a municipal basis occurred as part of the background work for the Transportation Plan Update. During this process municipal planning staff were consulted to not only determine municipal shares of population growth, but also to identify neighbourhoods where this growth would occur. Several factors were considered in allocating population on a municipal basis:

- past municipal population growth rates
- constraints on growth such as sewer and water capacities
- municipal official plans
- severance policies and settlement designations in the Townships
- municipal supply of industrial land

Table 2 shows the municipal allocation selected as the preferred alternative. In this allocation it is expected that Kitchener and Cambridge will maintain their share of the Region's population. Waterloo's growth share of 27.3% is much higher than its share of population in 1981 - 16.2% - but takes into account Waterloo's past historical growth rate as well as its supply of industrial land. The Townsnip's

share of population growth is expected to be less due to constraints on sewerage plant capacities and more restrictive severance policies.

As part of our ongoing monitoring program, we will monitor any changes in municipal growth rates. Should these changes be significant it could be necessary to revise our municipal allocations.

Table 1

Comparison of Percentage Growth of Census Populations of Municipalities (as a percentage of Regional Growth)

Municipalities	1971-1976	1976-1981	1971-1981
Kitchener	43.4%	48.2%	44.8%
Waterloo	24.2	17.2	22.0
Cambridge	22.0	29.3	24.4
Woolwich	6.8	1.5	5.1
Wilmot	1.6	2.2	1.8
Wellesley	.9	2.1*	1.3
North Dumfries	1.1	-.5	.6
Region	100%	100%	100%

Source: Statistics Canada, Census Populations 1971, 1976 and 1981

Table 2

Preferred Municipal Allocation of Population

Based on Transportation Plan Update (T.P.U.)

Allocation 1981 - 2001

Municipalities	Share of Growth	1981	1986	1991	1996	2001
Kitchener	45.1%	139,735	146,416	155,790	166,540	178,041
Waterloo	27.3%	49,430	53,474	59,150	65,658	72,622
Cambridge	26.8%	77,170	81,145	86,719	93,113	99,953
Woolwich	.5%	16,490	16,555	16,647	16,751	16,862
Wilmot	.1%	10,925	10,942	10,961	10,983	11,006
Wellesley	.1%	6,770	6,791	6,818	6,848	6,880
North Dumfries	.1%	4,965	4,986	5,013	5,043	5,076
Region	100%	305,490	320,309	341,098	364,936	390,440

POOR

QUALITY

ORIGINAL